PILOT'S FLIGHT OPERATING INSTRUCTIONS

FOR

P-51A-1, P-51A-2, P-51A-5
P-51A-10

BRITISH MODEL
MUSTANG II
AIRPLANES

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GRAY P. C., FOST., O. 9-22-44-9,200

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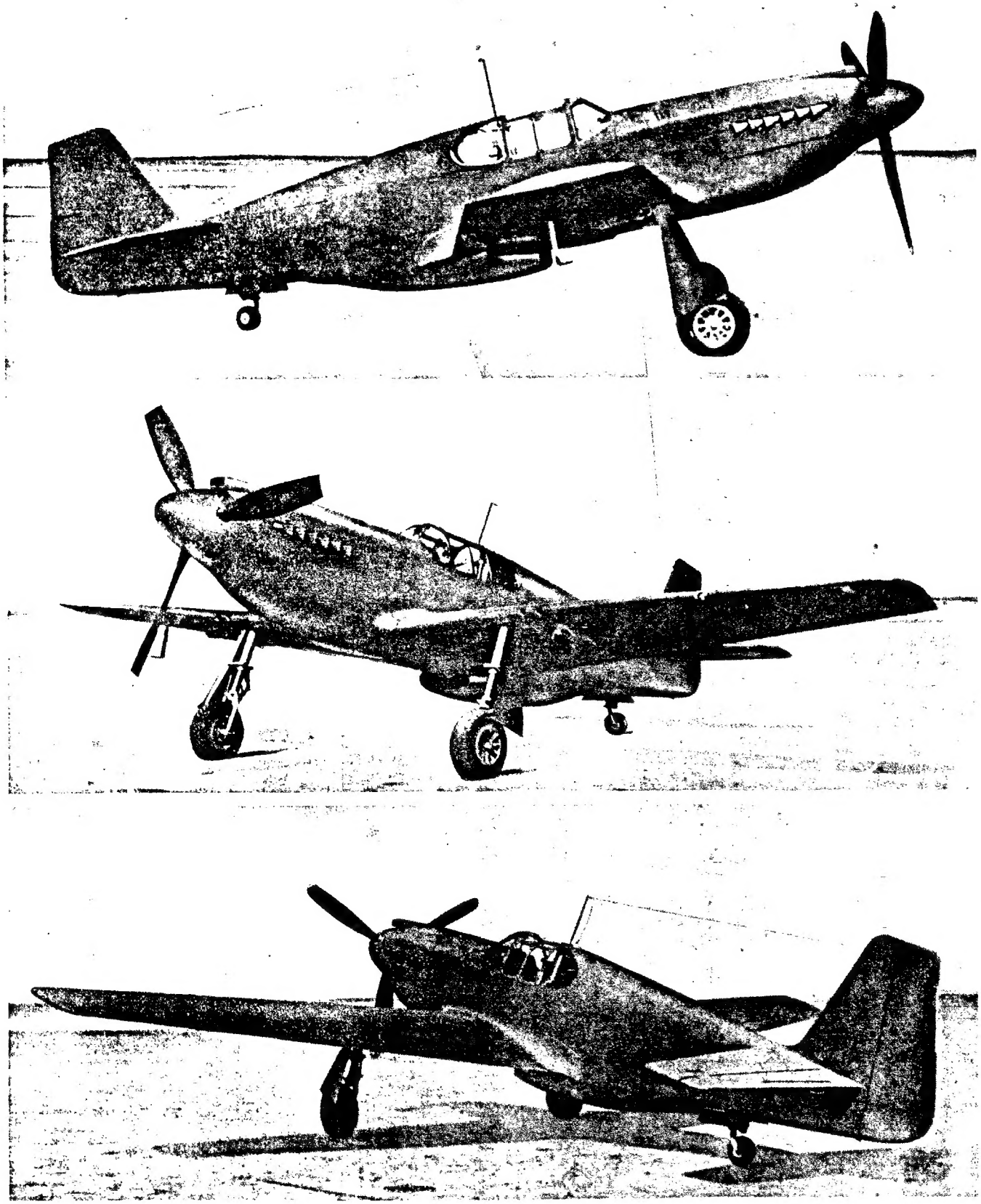


Figure 1—Three Views of Airplane

SECTION 1

DESCRIPTION

1. GENERAL.

The Model P-51A Series Airplane is a single-place, low wing fighter airplane. A 12-cylinder, liquid cooled engine drives an electric constant-speed, three blade propeller, which operates at half engine crankshaft speed. The airplane has a wing span of 37 feet 5/16 inches and an over-all length of 32 feet 2-5/16 inches. The over-all height, with the tail down, is 12 feet 8 inches.

2. FUSELAGE.

The fuselage is a semimonocoque, aluminum-alloy structure divided into three sections: engine mount, main fuselage, and aft section. An overturn structure is located aft of the pilot's seat. Armor plate is provided behind the pilot's seat and as part of the fire wall.

a. COCKPIT ENCLOSURE. — Armor plate glass is integral with the forward panel of the windshield. The cockpit is covered with a flush-type transparent hood. The left side of the hood hinges out and down, and the top section hinges up and out. Both sides have sliding windows. An emergency exit lever on the right-hand forward side of the cockpit instantly releases the entire hood for emergency egress.

b. CLEAR VISION PANEL.—To assure the pilot of better vision while flying in rain, sleet, or snow, a clear vision panel is incorporated in the left panel of the windshield. A negative pressure area at this point allows the panel to be opened without the elements entering the cockpit.

3. WING.

The wing is a semimonocoque, full-cantilever structure and consists of two sections bolted together. The sections employ the low-drag laminar-type airfoil. The ailerons are metal covered. The right aileron is equipped with a booster tab, and the left aileron is equipped with a combination booster and trim tab, the latter controllable from the cockpit. Hydraulically operated sealed-type wing flaps extend from the ailerons to the fuselage.

4. EMPENNAGE.

The empennage consists of a horizontal stabilizer, vertical stabilizer, elevators, and rudder. The elevators and rudder are cloth covered and are equipped with trim tabs controllable from the cockpit.

5. LANDING GEAR.

The landing gear consists of two main oleo struts and a steerable tail wheel. All three units are fully retractable hydraulically. The wheels of the main oleo struts are fitted with hydraulic brakes. The tail wheel may be locked by pulling the control stick back of neutral. In the locked position, the tail wheel is steerable 6 degrees to the right or the left. The tail wheel may be unlocked for full swiveling action by pushing the control stick forward of neutral.

6. HYDRAULIC SYSTEM.

The hydraulic system is utilized for the operation of the landing gear, tail gear, radiator air scoop, and wing flaps. A hydraulic accumulator is provided in the system so that pressure may be obtained instantaneously for the operation of the various systems.

7. POWER PLANT.

The power plant is an Allison V 1710-81 engine equipped with an injection type carburetor and an automatic manifold pressure regulator. The P-51A-2, P-51A-5, and P-51A-10 airplanes are equipped with a controllable carburetor air filter for use under dusty conditions. The filter is located in the carburetor air intake duct and may be controlled by the pilot so as to select either unfiltered rammed air or filtered unrammed air as required.

8. FUEL SYSTEM.

A fuel tank with a capacity of 90 gallons is located in each wing. There is no reserve fuel tank in this series airplane. Additional auxiliary tanks may be attached to the bomb racks under each wing. (Refer to section 4.) A manually controlled electrical booster pump is provided in addition to the engine-driven fuel pump.

9. OIL SYSTEM.

The oil tank, located on the forward side of the fire wall, is designed to allow the airplane to assume any attitude when the tank is full, and feed adequately in a vertical climb or dive when the tank is only one-fourth full. The oil radiator is located in the top center of the coolant radiator, and is equipped with automatic shutters. An automatic valve provides surge protection when the oil is cold.

10. COOLING SYSTEM.

The coolant tank is located on the inside top of the engine nose ring and protected with armor plate between the tank and the propeller spinner. The coolant radiator is located at the bottom of the fuselage, aft of the cockpit. The rear radiator air scoop is hydraulically operated and may be adjusted by the control handle located at the aft end of the control pedestal to the left of the pilot's seat. The front radiator air scoop is not adjustable.

11. GUNNERY EQUIPMENT.

This airplane carries two .50-caliber machine guns mounted in each wing panel. The maximum ammunition allotment is 280 rounds for the rear ammunition compartment and 350 rounds for the front compartment. Provision is made for a gun camera in the forward section of the left wing inboard of the gun bay. An optical gun sight and auxiliary ring and bead sight are provided.

12. BOMBING EQUIPMENT.

A readily removable, streamline bomb rack is installed on each outer wing panel. Each rack will accommodate one 100-, 250-, 300-, or 500-pound bomb.

13. OXYGEN SYSTEM.

A low-pressure demand type oxygen system is provided, with the regulator located on the right-hand side of the instrument panel. The oxygen cylinders may be recharged without removing them from the airplane.

14. RADIO.

Various combinations of the following radio sets, the SCR-274, SCR-522, SCR-535, SCR-515 and SCR-695 may be installed in the radio compartment immediately behind the overturn structure. Normally the SCR-522 and SCR-695 will be installed.

15. LIGHTS.

Conventional position lights are provided on the upper and lower surfaces of the wing tips and at the trailing edge of the rudder. One sealed-beam type landing light is located in the leading edge of the left wing. The instrument panel is illuminated by fluorescent lights. The cockpit is illuminated by two type A-7 cockpit lights. The controls for all lighting are mounted on their respective switch panels in the cockpit. Provisions are made for the installation of an AN-3089 interaircraft signal light which may be stowed to the left of the pilot's seat.

16. ANTI-ICING SYSTEM.

Anti-icing systems are provided for the propeller, windshield, and the carburetor. When installed for ferrying purposes, the propeller anti-icing system is comprised of a 2.9 U. S. (2.3 Imperial) gallon capacity tank installed in the rear left-hand ammunition box feeding through an electric pump to the propeller fluid feed shoes. A 1-gallon capacity tank is installed behind the pilot's seat for propeller anti-icing during combat missions. An electric switch on the left side of the cockpit operates both systems.

WARNING

Use only noninflammable fluid in the combat anti-icing tank.

A spray jet provides fluid for the windshield from the coolant system and is controlled by a valve located on the upper right side of the instrument panel. On the P-51A-1 airplanes, the pilot may shut off the rammed air to the carburetor and allow warm air from the engine compartment to flow into the carburetor which will prevent carburetor icing under some conditions. The control for this operation is on the left side on the instrument panel. On the P-51A-2, P-51A-5 and P-51A-10 airplanes, an additional control is provided. This allows the pilot to draw air heated by exhaust gases into the carburetor for ice prevention or elimination.

17. HEATING AND VENTILATING.

A hot air valve is located to the right of the control stick; a cold air valve is to the left of the control stick. The windshield defroster system may be controlled by a knob on the hot air valve. A wooden bulkhead is located aft of the cockpit to keep drafts at a minimum.

18. MISCELLANEOUS EQUIPMENT.

a. PYROTECHNICS.—A signal pistol is located on the left side of the cockpit within reach of the pilot. The signal cartridges for the pistol are stowed to the left and aft of the pilot's seat.

b. PILOT'S SEAT.—The pilot's seat is made of plywood and will accommodate a seat-type parachute. The back cushion is kapok filled and may therefore be used as a life preserver. The seat is equipped with a type B-11 safety belt and a standard Air Corps type shoulder harness attached to a spring-loaded mechanism. The control lever for the shoulder harness is on the forward left side of the seat, and the vertical adjustment lever for the seat is located on the forward right side.

c. PILOT'S RELIEF TUBE.—The relief tube horn is stowed on a bracket at the left under side of the pilot's seat. The tubing extends along the lower inboard side of the fuselage, emerging through an aluminum scoop outlet beneath the rudder.

d. FIRST-AID KIT.—A medical first-aid kit is attached to a bracket on the left fuselage side panel in the radio compartment.

e. INCENDIARY BOMBS.—Provision is made for two incendiary bombs, one located on each side of the seat, for destruction of the airplane if forced down in hostile territory.

f. DUST EXCLUDERS.—Canvas dust excluders are provided for the main landing gear shock struts and are secured to the struts by zipper fasteners. Another canvas dust excluder is permanently installed inside of the tail wheel well. Dust excluder boots are provided for all hydraulic cylinders.

g. ENGINE CRANK.—An engine crank and an extension shaft are stowed on brackets at the back of the right-hand main landing gear well.

h. MOORING KIT.—A mooring kit is attached to the left side of the fuselage in the rear compartment.

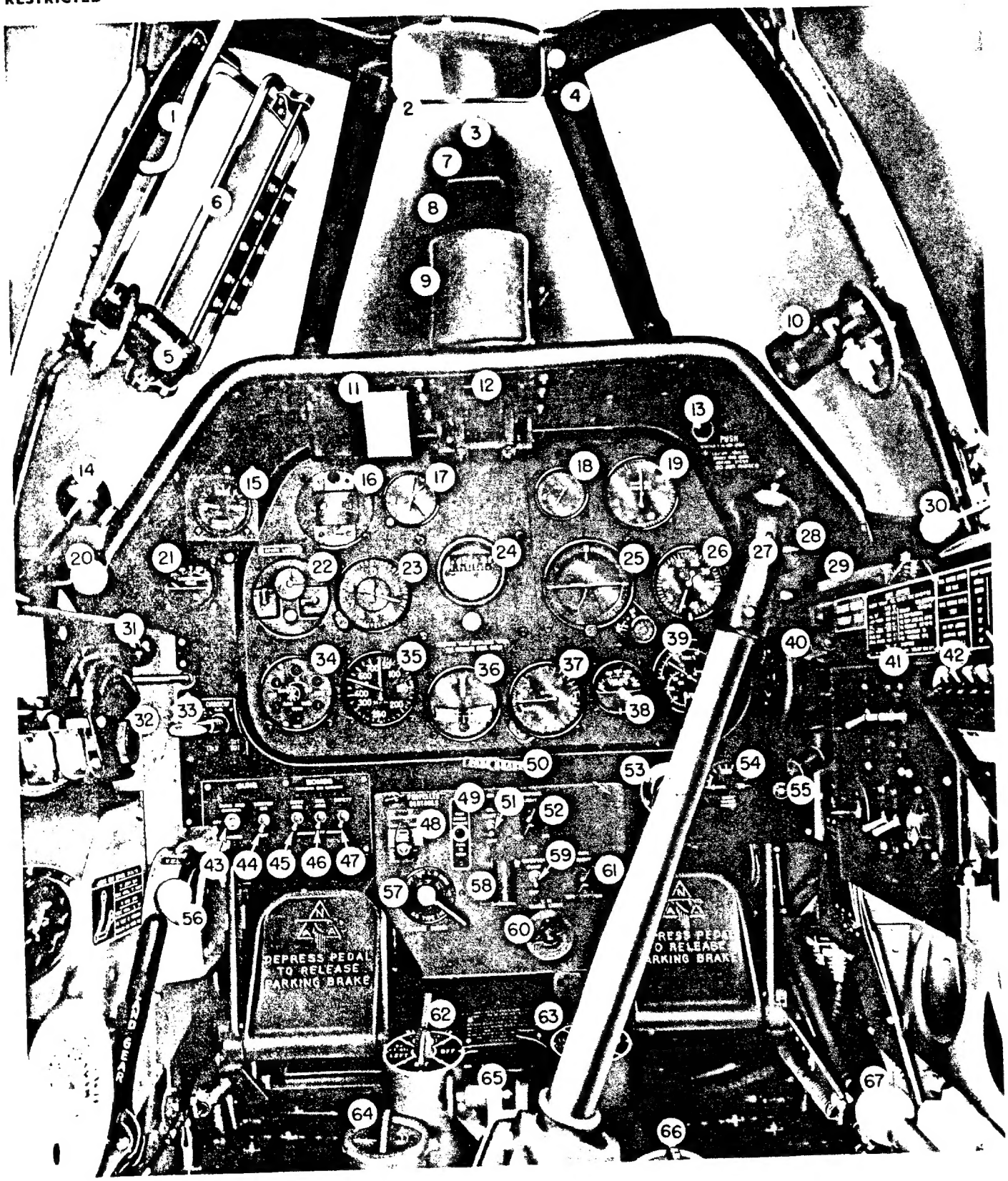


Figure 2—Cockpit—Front View

Cockpit—Front View

(Figure 2)

1. Enclosure Lock Handle
2. Mirror
3. Armor Plate Glass
4. Ring Sight Socket
5. Cockpit Fluorescent Light
6. Clear Vision Panel
7. Sun Screen
8. Gun Sight Reflector
9. Crash Pad
10. Cockpit Fluorescent Light
11. Instrument Calibration Cards
12. Gun Sight
13. Windshield De-Icer Control
14. Throttle
15. Hydraulic Pressure Gage
16. Compass
17. Clock
18. Suction Gage
19. Manifold Pressure Gage
20. Mixture Control
21. Carburetor Temperature Gage
22. Remote Contactor
23. Altimeter
24. Directional Gyro
25. Flight Indicator
26. Tachometer
27. Control Stick Grip
28. Oxygen Flow Blinker
29. Enclosure Emergency Release Handle
30. Sliding Window Lock Handle
31. Propeller Constant Speed Control
32. Quadrant Friction Control
33. Carburetor Air Control
34. Landing Gear Indicator
35. Air-Speed Indicator
36. Bank-and-Turn Indicator
37. Rate-of-Climb Indicator
38. Coolant Temperature Indicator
39. Oil Temperature and Fuel and Oil Gage
40. Oxygen Regulator
41. Engine Limitations Plate
42. Airplane Restrictions Plate
43. Gun and Camera Safety Switch
44. Gun Heater Switch
45. Bomb Nose Arming Switch
46. Bomb Tail Arming Switch
47. Bomb Safety Switch
48. Propeller Selector Switch
49. Propeller Circuit Breaker Switch
50. Parking Brake Control Handle
51. Oil Dilution Switch
52. Compass Light Switch and Rheostat Control
54. Oxygen Pressure Gage
55. Oxygen System Warning Lamp
56. Bomb Control Handle
57. Ignition Switch
58. Starter Switch
59. Booster Pump Switch
60. L. H. Fluorescent Light Control
61. Gun Sight Switch and Rheostat Control
62. Main Fuel System Selector Valve
63. Auxiliary Fuel System Selector Valve
64. Cockpit Cold Air Valve
65. Surface Control Lock
66. Cockpit Hot Air Valve
67. Hydraulic Hand-Pump

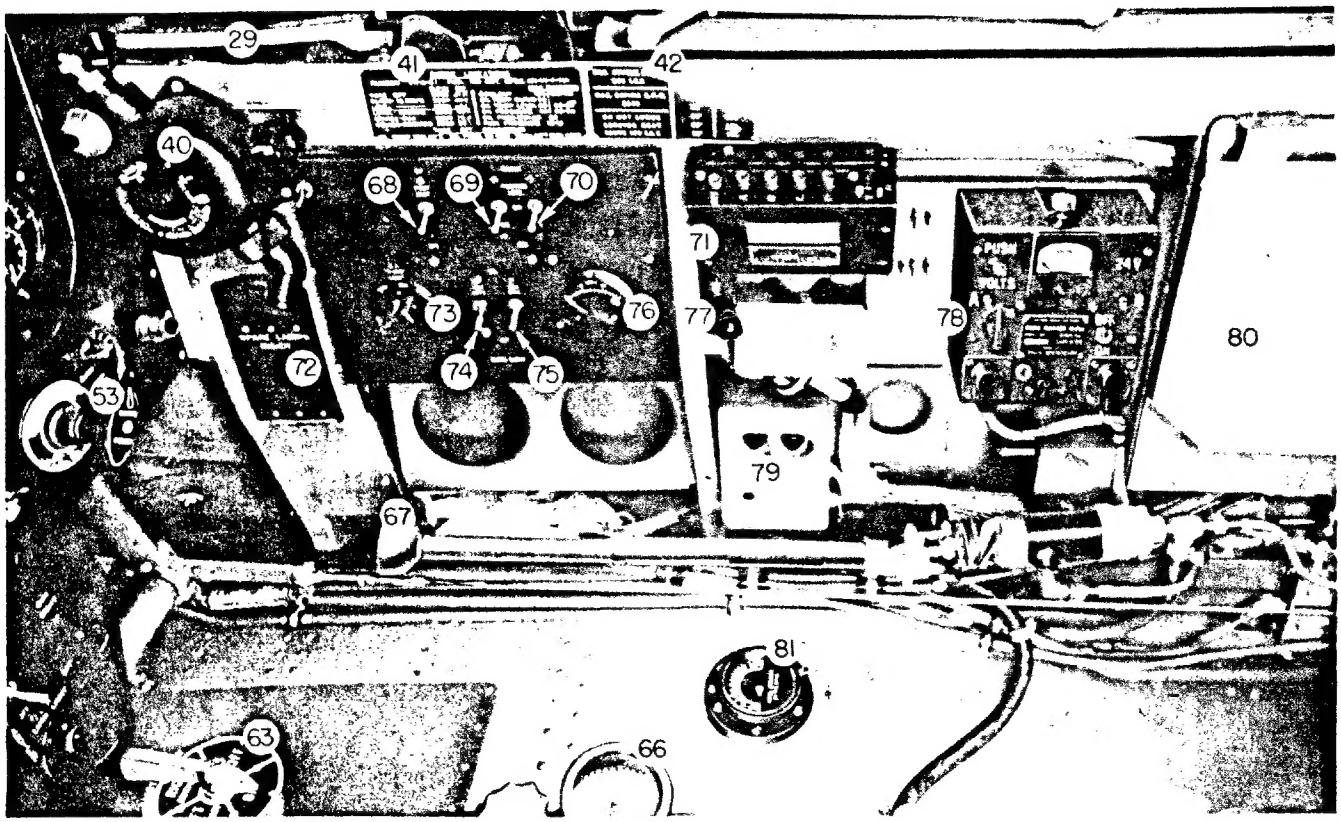


Figure 3—Cockpit—Right Side

29. Enclosure Emergency Release Handle
40. Oxygen Regulator
41. Engine Limitations Plate
42. Airplane Restrictions Plate
53. Engine Primer
63. Auxiliary Fuel System Selector Valve
66. Cockpit Hot Air Valve
67. Hydraulic Hand-Pump
68. Pitot Heater Switch
★ 69. Wing Position Light Switch ★
70. Tail Position Light Switch
71. Scr-522 Radio Control Box
72. Spare Lamps Compartment
73. R. H. Fluorescent Light Control
74. Landing Light Switch
75. Generator Disconnect Switch
76. Ammeter
77. Cockpit Light
78. Scr-535 Radio Control Box
79. Detonator Switch
80. Map Case
81. Right Fuel Tank Gage

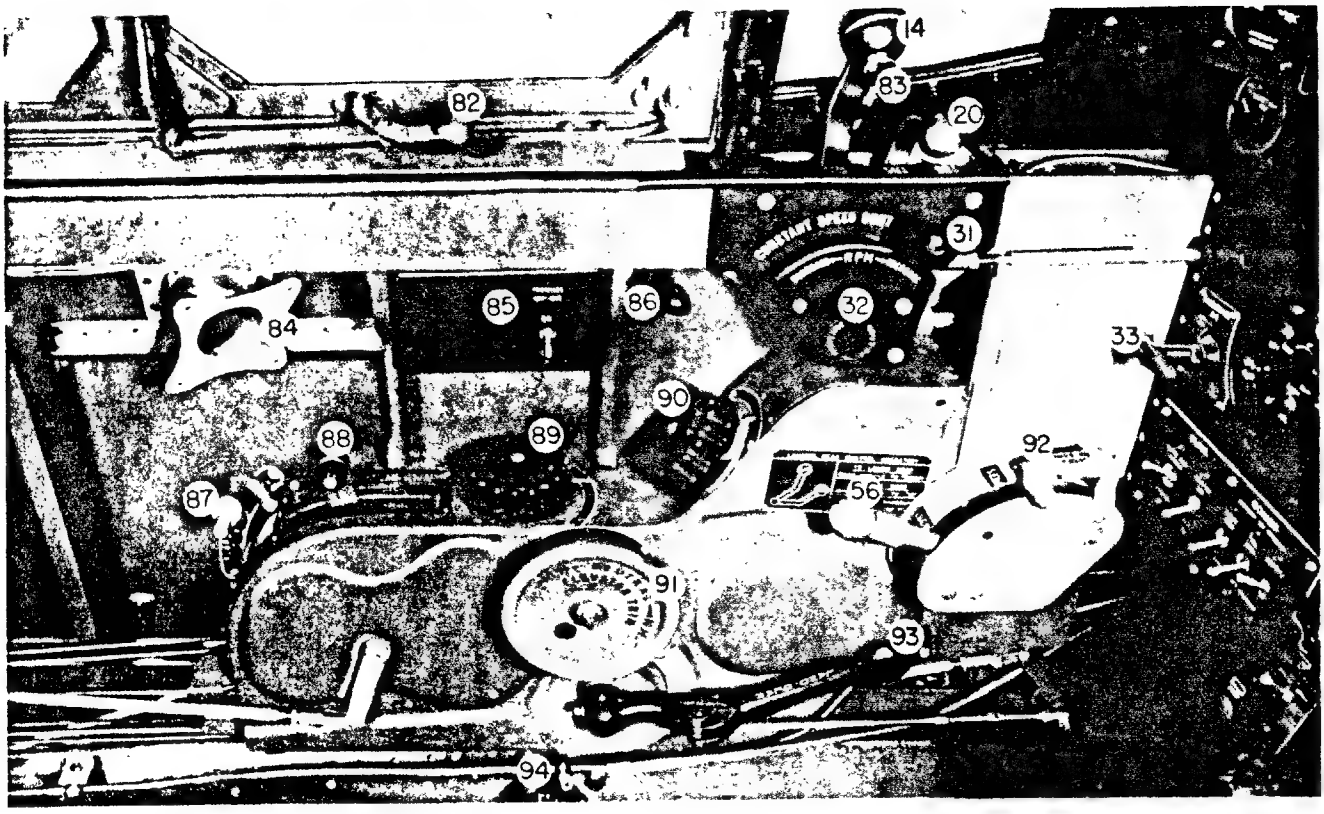


Figure 4—Cockpit—Left Side

14. Throttle
20. Mixture Control
31. Propeller Constant Speed Control
32. Quadrant Friction Control
33. Carburetor Air Control
56. Bomb Control Handle
82. Sliding Window Lock Handle
83. Microphone Press-to-Talk Switch
84. Signal Pistol Holder ★
85. Propeller-Anti-Icing Switch ★
86. Cockpit Light
87. Flap Control Handle
88. Radiator Air Scoop Control Handle
89. Rudder Trim Tab Control
90. Aileron Trim Tab Control
91. Elevator Trim Tab Control
92. Bomb Control Antisalvo Guard
93. Landing Gear Control
94. Left Fuel Tank Gage

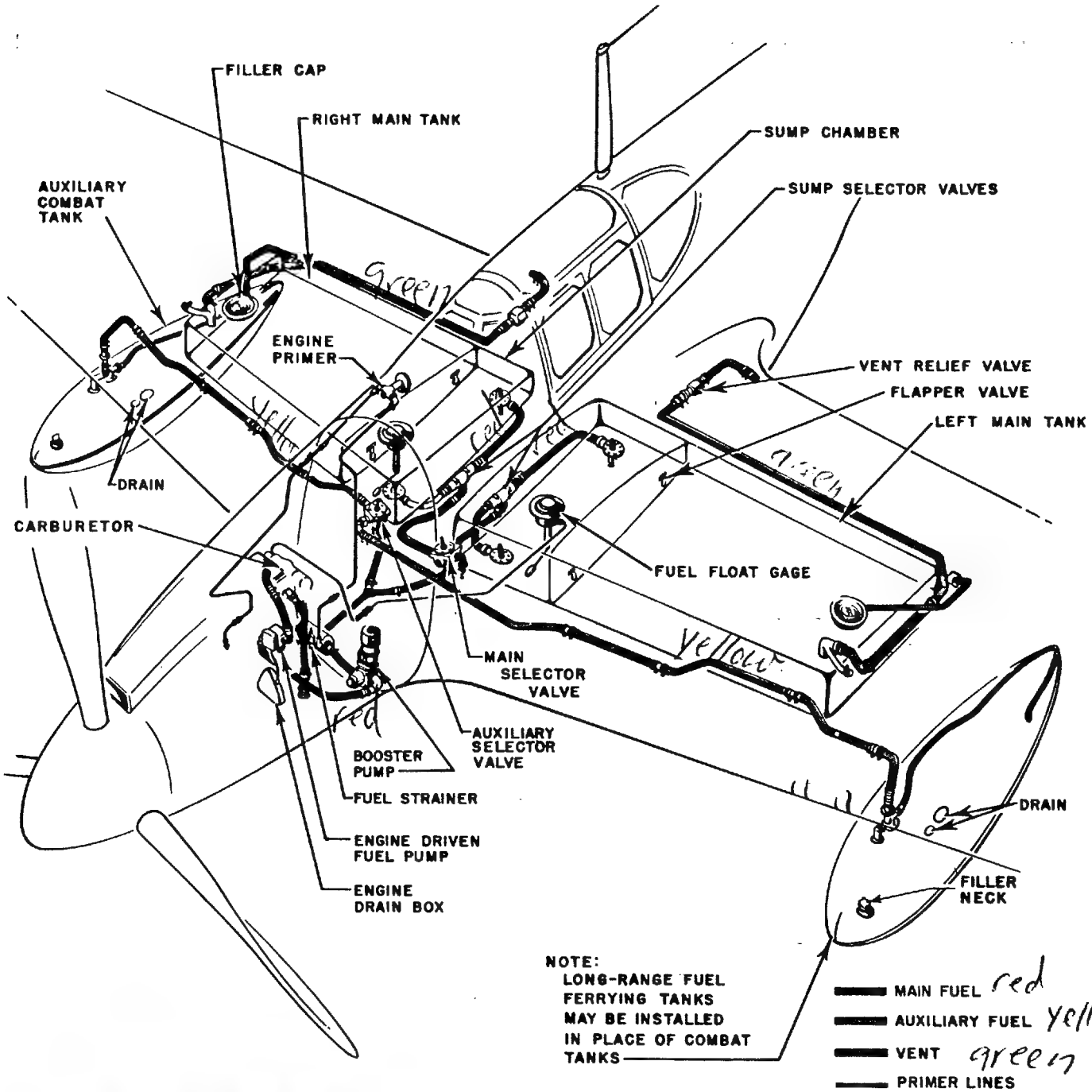


Figure 5—
Fuel System Diagram

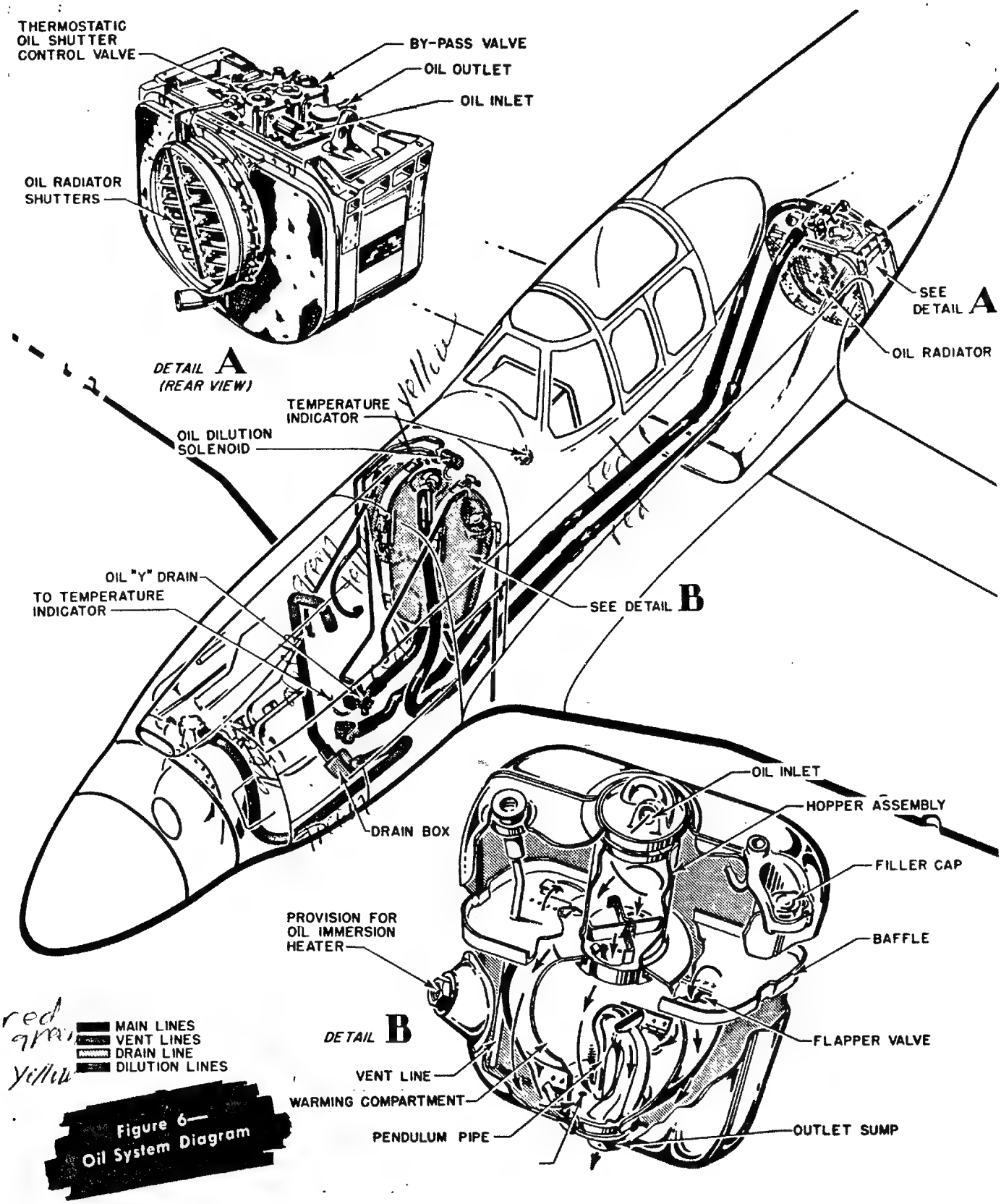


Figure 6—Oil System Diagram

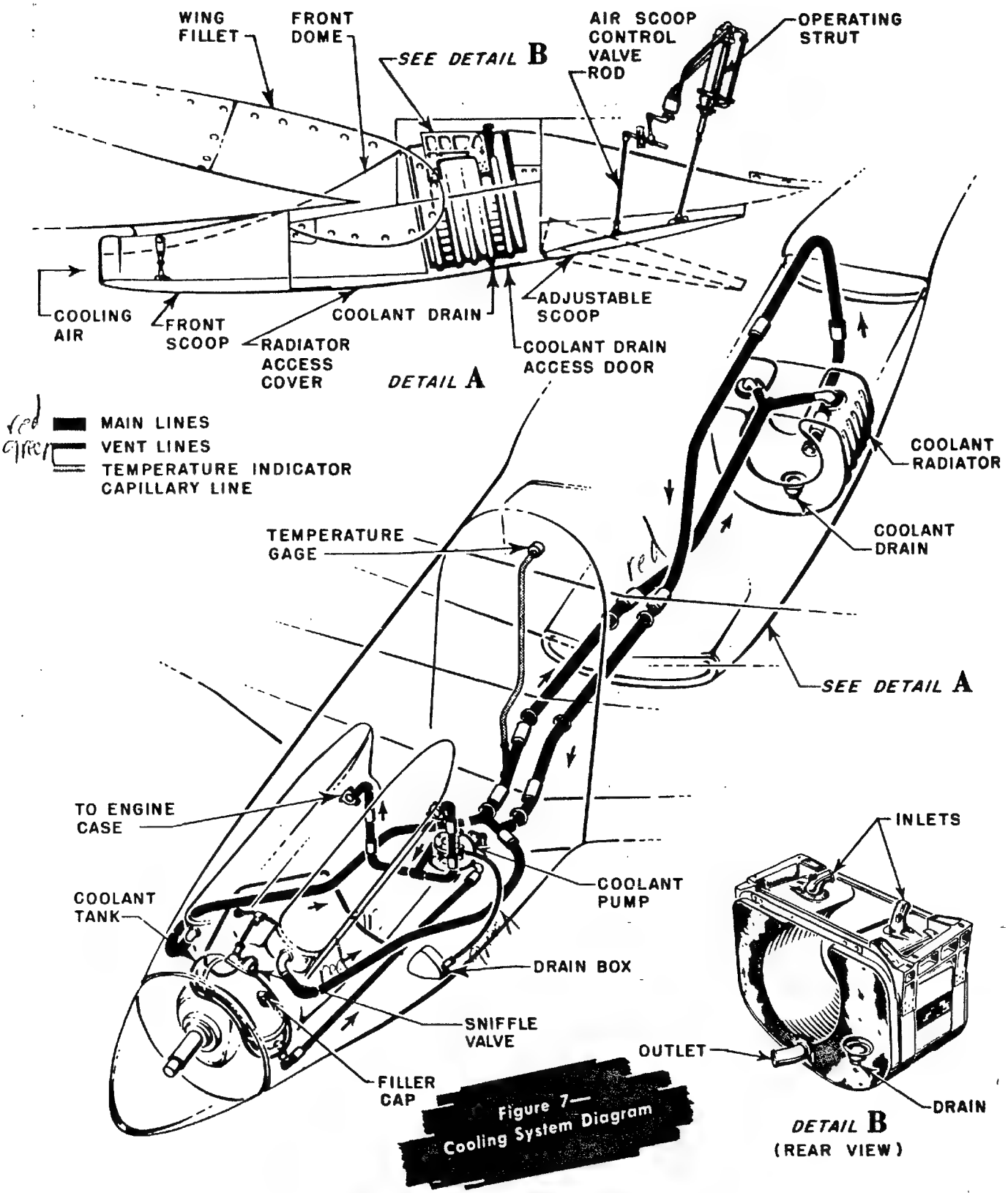
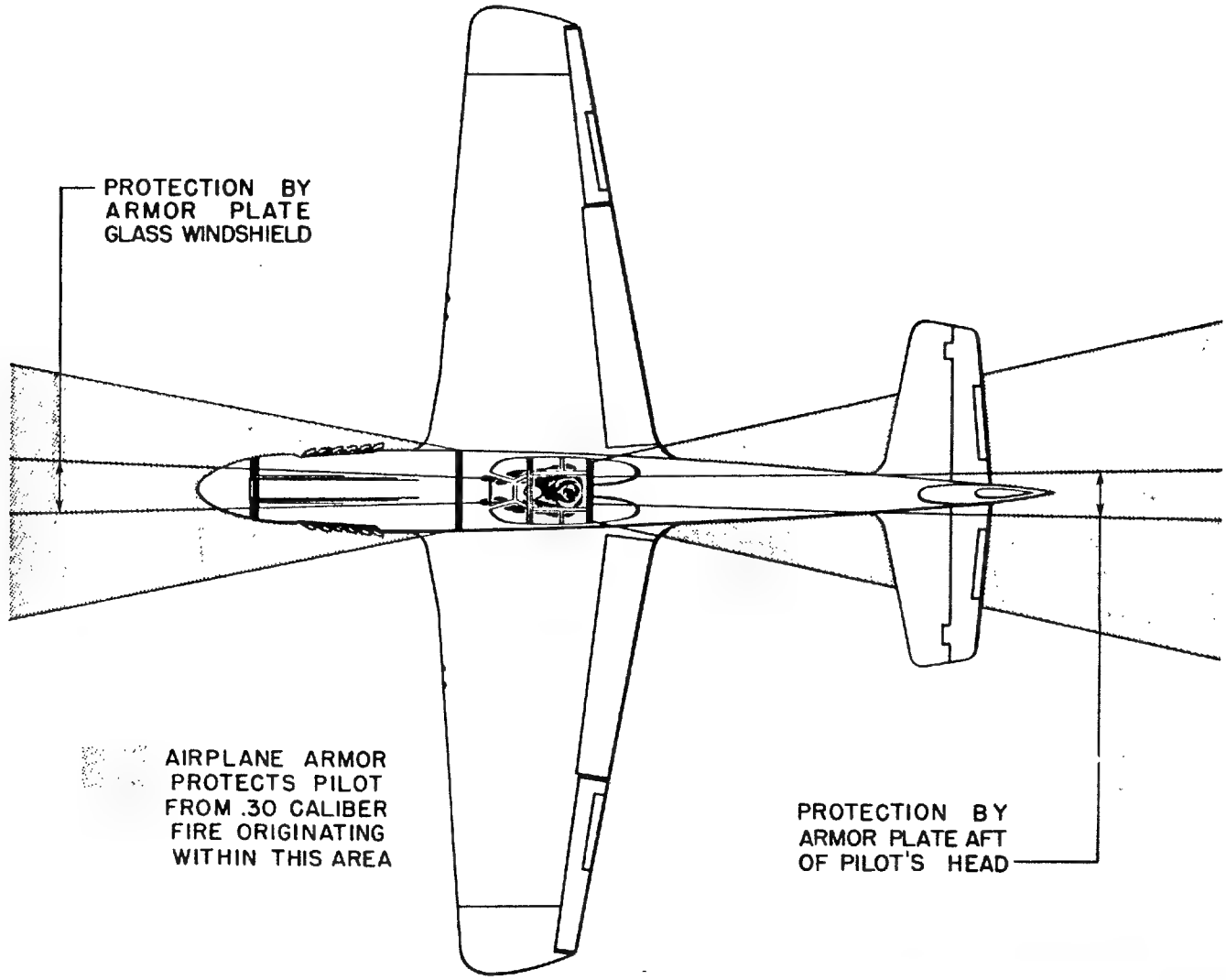


Figure 7—
Cooling System Diagram



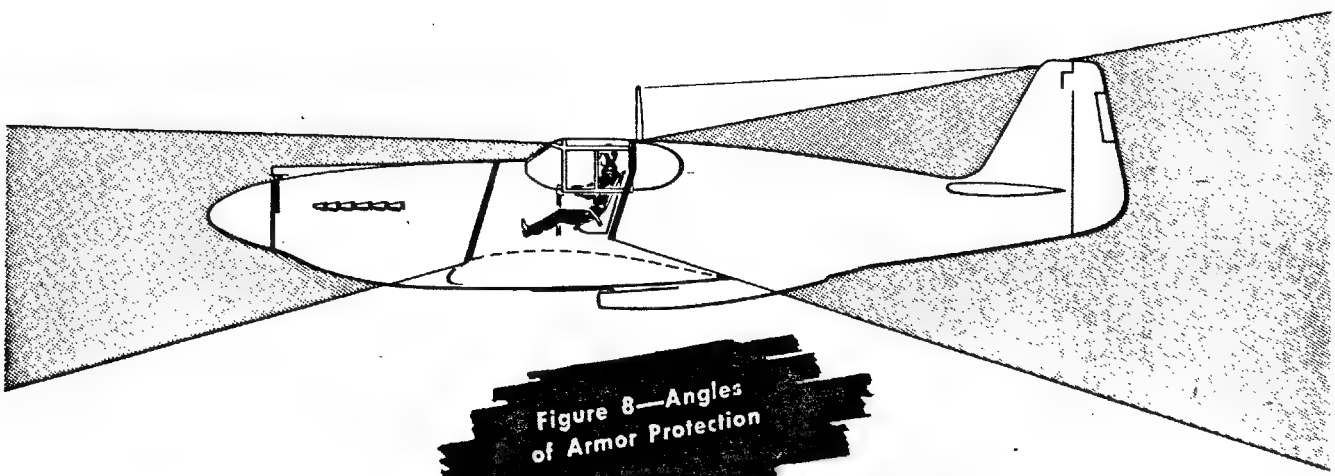


Figure 8—Angles of Armor Protection

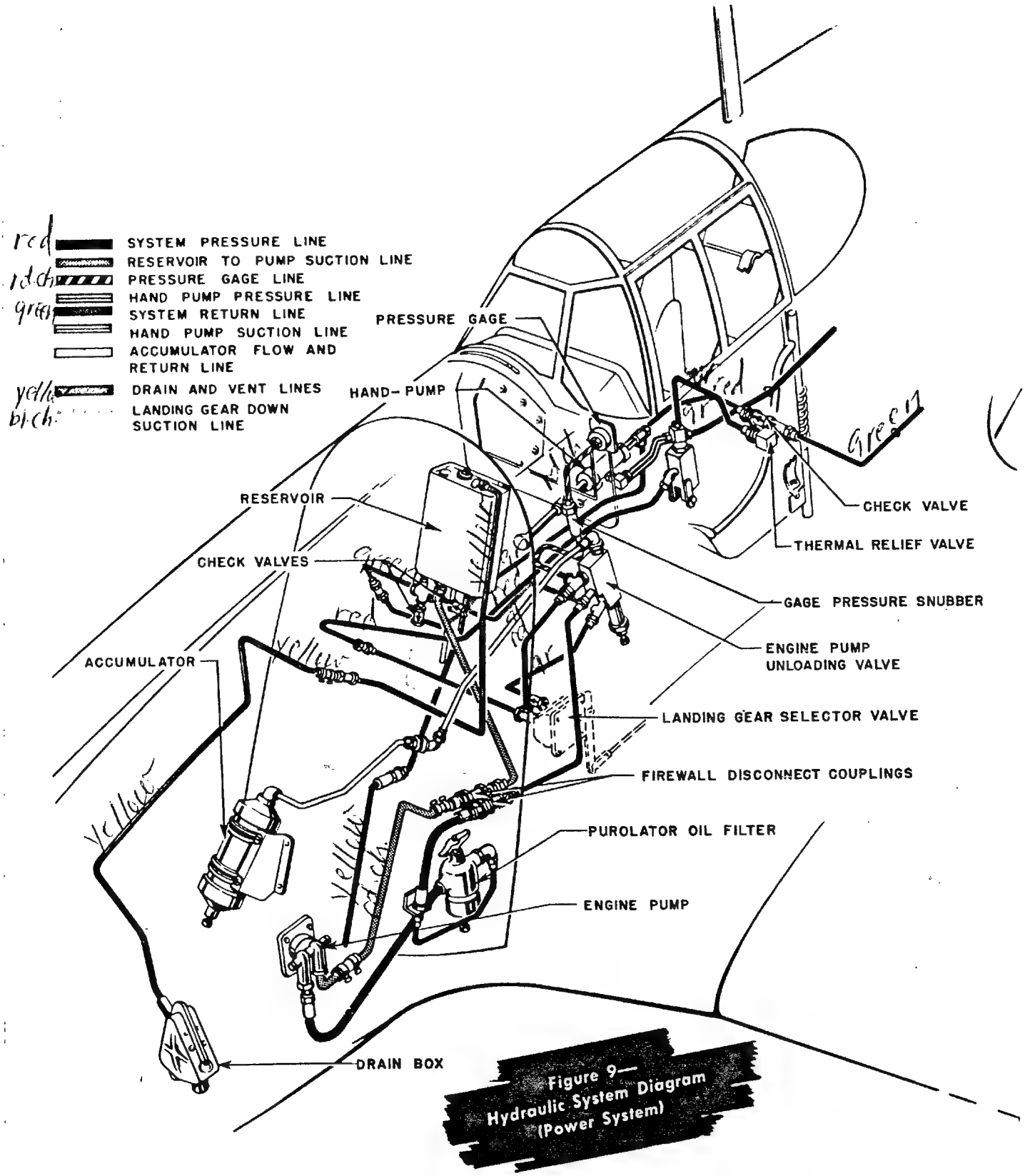


Figure 9—
Hydraulic System Diagram
(Power System)

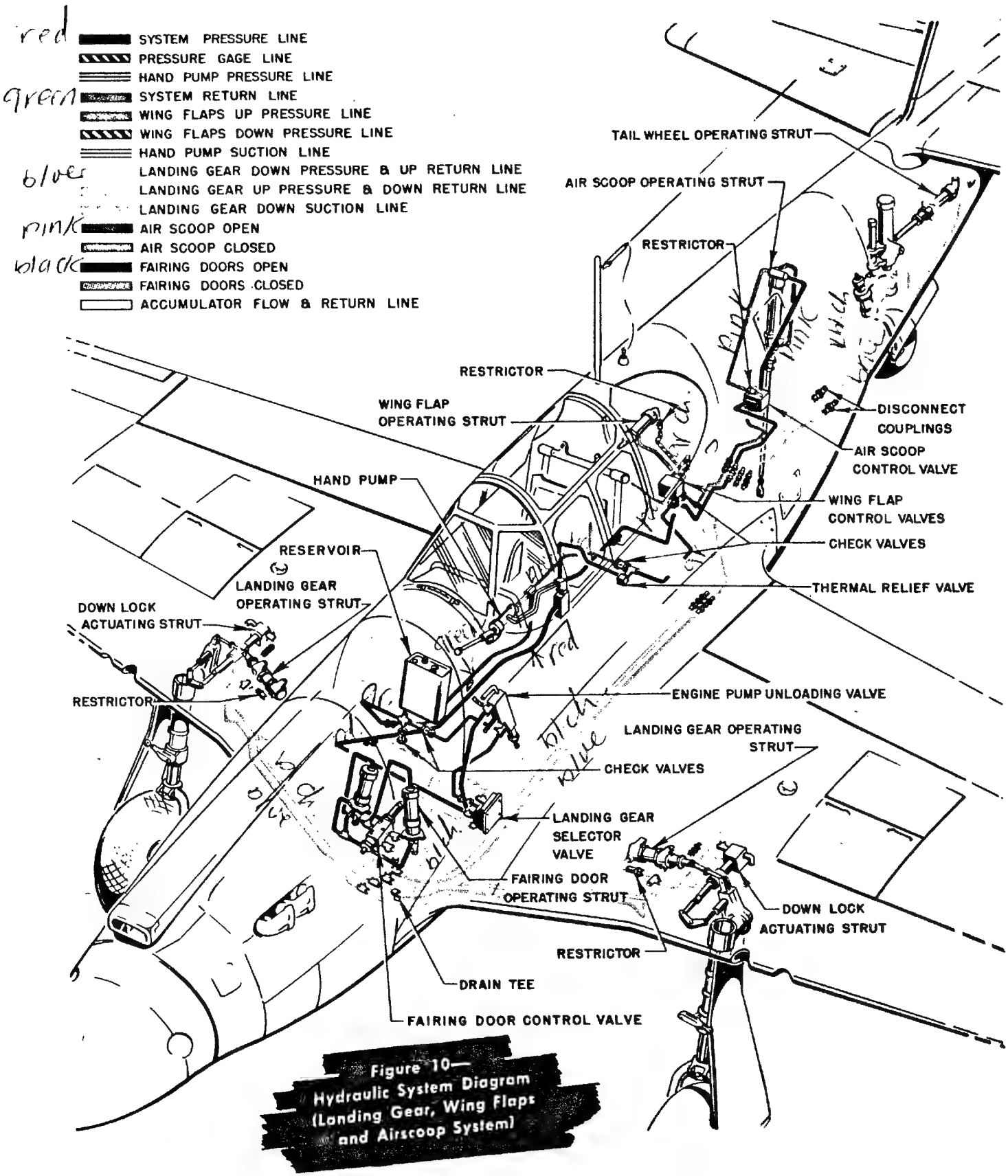


Figure 10—
Hydraulic System Diagram
(Landing Gear, Wing Flaps
and Airscoop System)

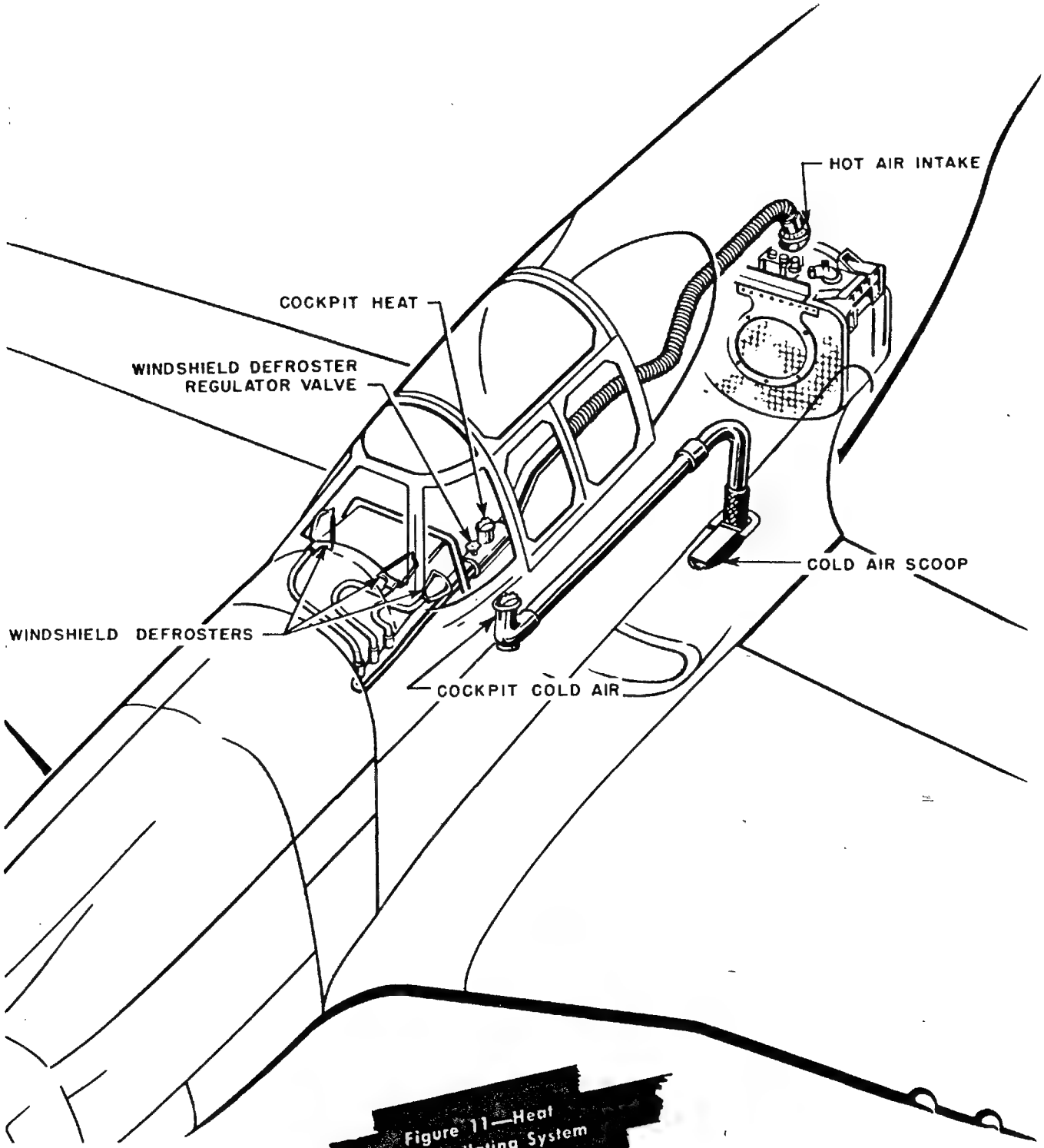


Figure 11—Heat and Ventilating System

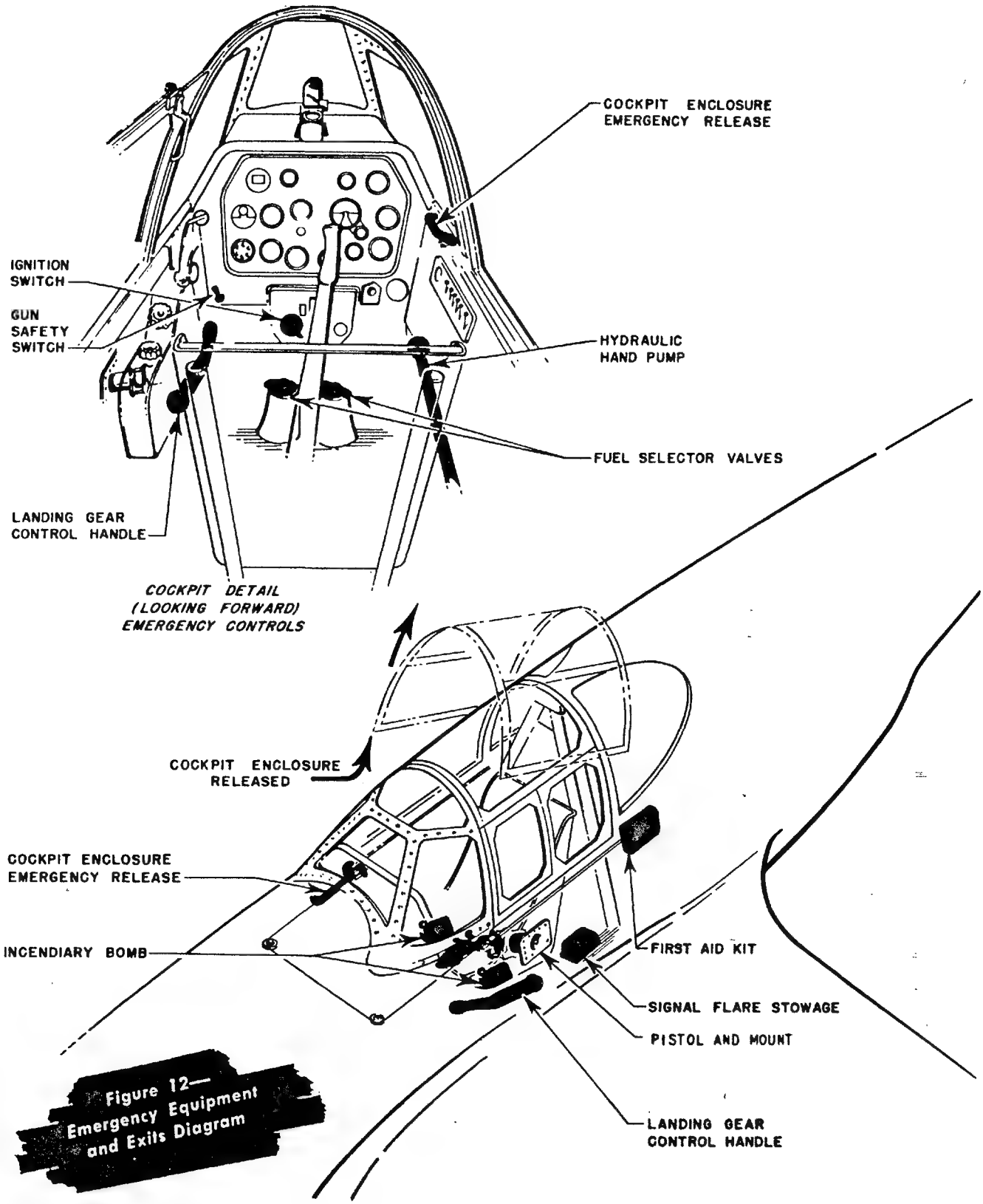


Figure 12—
Emergency Equipment and Exits Diagram

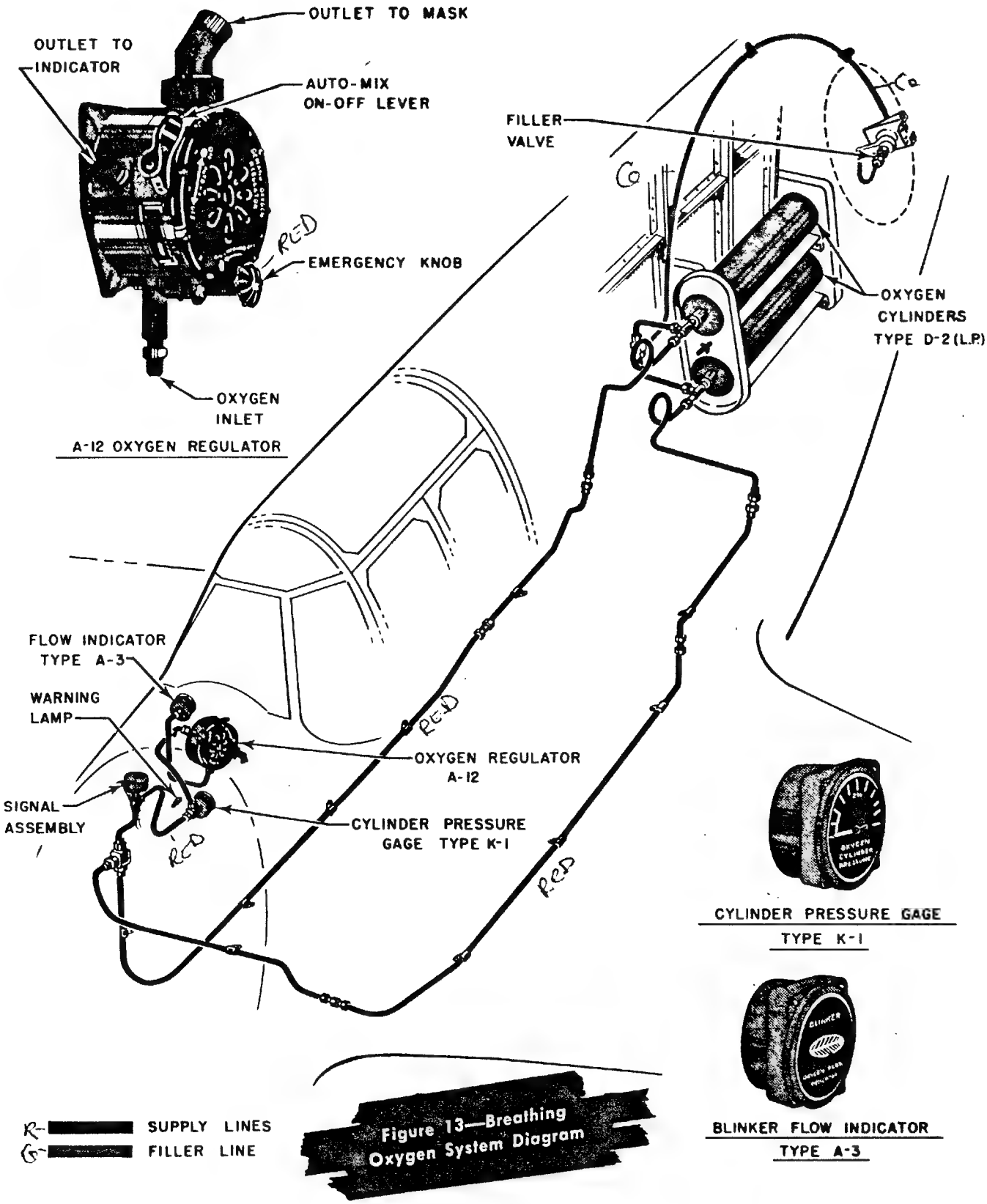


Figure 13—Breathing Oxygen System Diagram

SECTION 2

PILOT'S OPERATING INSTRUCTIONS

NOTE

For the location of controls mentioned below, refer to figures 2, 3 and 4 at the end of section 1. An airplane operation check list and engine limitations plate are provided in the pilot's cockpit.

1. BEFORE ENTERING COCKPIT.

Make the following inspections:

a. Ascertain that the total weight of fuel, oil, ammunition and special equipment carried are suited to the mission to be performed. This is most important in the case of combat missions as the rate of climb of the airplane may vary a full 500 feet per minute dependent on the load carried.

b. Make sure that the airplane has been serviced and is ready for flight, especially in regard to proper quantities of fuel and oil. See that there is nothing loose in the cockpit, such as the safety harness, microphone cords, etc., which might foul the controls or otherwise affect the operation of the airplane.

2. ON ENTERING COCKPIT.

a. SPECIAL CHECK FOR NIGHT FLYING.

(1) Test operate cockpit swivel lights. (See No. 77, figure 3 and No. 86 figure 4.) These lights are switched on by means of a knurled knob on top of the fixture base.

(2) Test operate landing lights. (See No. 74, figure 3.)

(3) Test operate gun sight illumination. (See No. 61, figure 2.) The "ON-OFF" switch and rheostat are controlled by the same knob.

(4) Test operate position lights. (See No. 69 and No. 70, figure 3.)

(5) Test operate fluorescent instrument lights. The rheostat knobs for these lights are located as shown by No. 60, figure 2 and No. 73, figure 3.

(6) Test operate compass light. (See No. 52, figure 2.) The "ON-OFF" switch and rheostat are controlled by the same knob.

b. CHECK FOR ALL FLIGHTS.

(1) Parking Brakes on. (See No. 50, figure 2.)

(2) Flight controls unlocked. Test for free operation.

(3) Flaps "UP." (See No. 87, figure 4.)

(4) Landing gear control handle "DOWN." (See No. 93, figure 4.)

(5) Oxygen supply. Check pressure gage for sufficient supply. (See No. 54, figure 2.)

(6) Ignition switch at "BAT." (See No. 57, figure 2.)

(7) Generator disconnect switch "ON." (See No. 75, figure 3.)

(8) Optical gun sight. Test operate. (See No. 61, figure 2.)

(9) Propeller. Push circuit breaker. (See No. 49, figure 2.)

(10) Fuel tanks. Check contents. (See No. 81, figure 3, and No. 94, figure 4.)

(11) Fuel selector valve. Turn to "LEFT" or "RIGHT." (See No. 62, figure 2.)

(12) Radiator scoop closed. (See No. 88, figure 4.)

(13) Altimeter set to proper reading. (See No. 23, figure 2.)

(14) Enclosure fastening. The "WARNING" pins in the right sliding window track must be down flush to indicate proper fastening of the enclosure.

(15) Bomb safety switch "OFF." (See No. 47, figure 2.)

(16) Bomb release handle. If bombs, fuel tanks, depth charges, or chemical tanks are installed on the racks make sure that the bomb release handle is in the "LOCK" position and the antisalvo guard is in place. (See No. 56 and No. 92, figure 4.)

c. MAKE THE FOLLOWING PREPARATIONS.

(1) Adjust the rudder pedals for proper leg length so as to obtain full brake control while taxiing. Adjustment may be made with the foot by pressing the lever located on the inner side of each rudder pedal.

(2) Adjust the seat level to obtain full travel of the rudder pedals in the extreme positions. The adjustment lever for raising or lowering the seat is located on the lower right side of the seat.

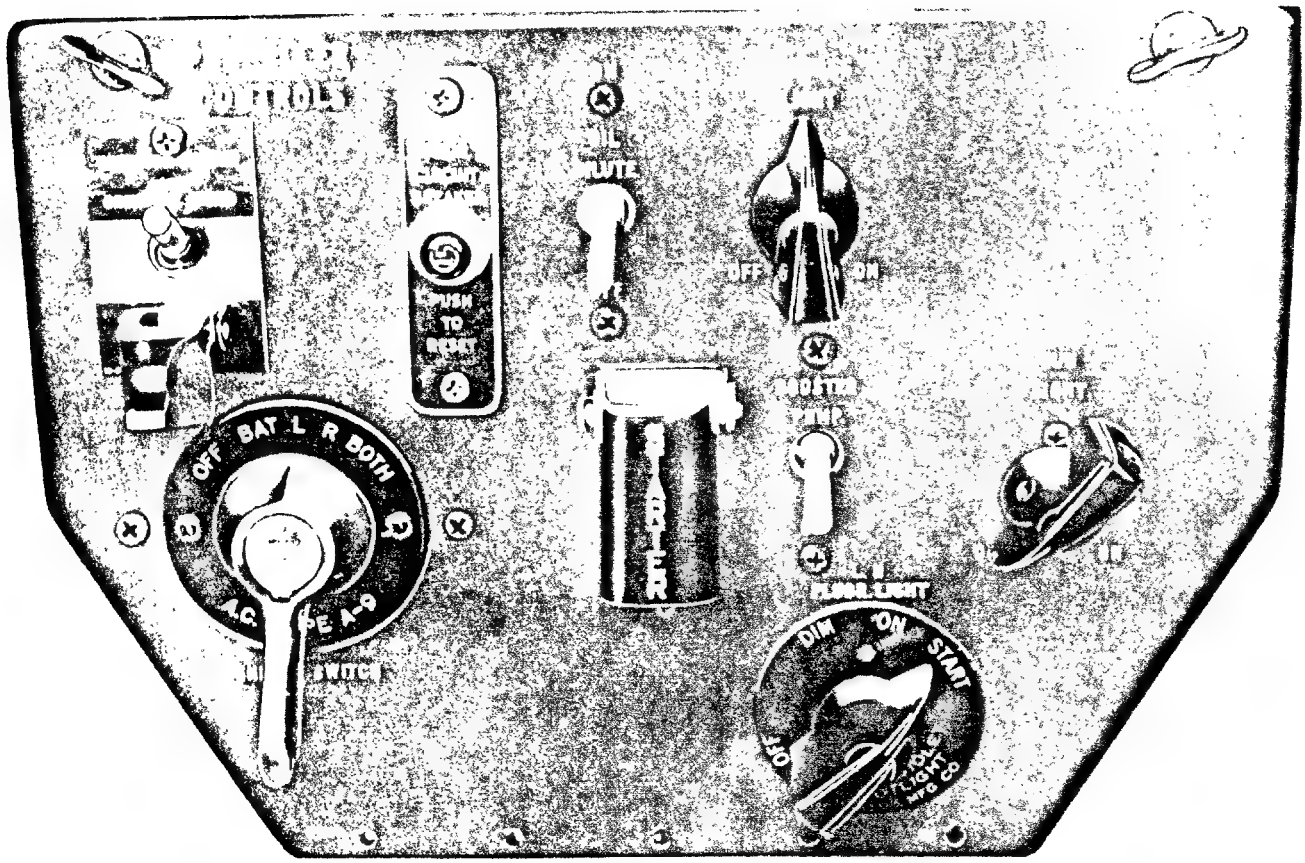


Figure 14—Pilot's Front Switch Panel

(3) Pull out on the handle of the emergency hydraulic hand pump and rotate clockwise to lock it in its fully extended position. It is located to the right of the pilot's seat as shown by No. 67, figure 3. Operate the pump to see whether hydraulic pressure can be obtained as indicated by the gage. (See No. 15, figure 2.)

(4) Check the radio system to see that it is working properly. Instructions for operating the radio system will be found in section 4.

(5) Close the cockpit sliding windows. The sliding windows should be kept closed at all times on the ground with the engine running, and also when taking off, or when a landing is being made. This is necessary to prevent exhaust gases from entering the cockpit. The sliding windows may be opened in flight as desired.

3. STARTING ENGINE.

Proceed as follows:

a. Turn the ignition switch to the "OFF" position.

b. Pull the propeller through several turns if the engine has been idle for more than 2 hours.

c. Place the carburetor air control at the position marked "COLD" so as to limit the danger in case of backfire.

d. Close the radiator air scoop. The control handle is located at the aft end of the control pedestal.

e. Set the propeller control located beside the throttle to the "INCREASE RPM" (low pitch) position.

f. Set the propeller selector switch in the "AUTO CONSTANT SPEED" position and push the propeller circuit breaker button to ascertain that the electrical circuit to the propeller governor is complete. Raise the safety guard over the selector switch. Both propeller controls are located on the pilot's switch panel.

g. Set the mixture control at the "IDLE CUT-OFF" position.

h. Set the throttle approximately ¾-inch open.

i. Turn the main system fuel selector valve to LEFT; auxiliary system "OFF." The reason for using the left

tank for starting and take-off is that the carburetor vent empties into the left tank only. If both tanks are full, then feeding the engine from the right tank could cause either loss of fuel from the left tank vent line or, if the check valve prevents that, a dangerous pressure build-up in the left tank.

j. Set the fuel booster pump switch, located on the pilot's switch panel, to the "ON" position. The fuel pressure gage should indicate 10 pounds per square inch shortly after the booster pump is turned on.

k. Prime the engine three to four strokes when cold, one stroke when warm. The priming system is independent of the carburetor, and caution must be exercised not to overprime the engine in view of the extreme effectiveness of the priming system. No priming action nor fuel discharge can be obtained by pumping the throttle. After priming, ascertain that the primer is locked in the "OFF" position.

l. See that all personnel are clear of the propeller; then turn the ignition switch to the "BOTH" position.

m. Uncover the starter switch by pulling the hinge cover upward. Press the starter switch to the "ENERGIZE" position; and when the flywheel has reached maximum speed, press the switch upward to the "CRANK" position to engage the starter with the engine. Provision for connecting an external electrical supply is made by means of a plug connector located in the fillet on the right side of the fuselage, aft of the pilot's cockpit. Provisions are also made for hand-starting the engine by means of a starter crank and extension stowed in the right wheel well. The starter crank may be removed by loosening the wing nut on the clamp around the arm of the crank. The extension shaft is removed by twisting up and pulling outward. To start the engine by means of the crank, insert the crank and extension through the hole in the lower aft engine cowl into the funnel-shaped starter attachment.

n. As the engine starts, move the mixture control to the "AUTO-RICH" position. If the engine does not start after one or two turns, move the mixture control out of and then back to the "IDLE CUT-OFF" position.

o. If a heavy viscous oil is indicated by oil pressure that is too high, or by oil pressure that fluctuates or falls back when the engine rpm is increased, the dilution valve should be held on (as much as 2 minutes may be required) to dilute the oil and correct this condition. Overdilution will result in low oil pressure and should be avoided.

4. ENGINE WARM-UP.

Warm up the engine at 1000 to 1200 rpm until the oil temperature shows a definite increase and the oil pressure remains steady when the throttle is opened. If the oil pressure does not reach 60 pounds per square inch within 30 seconds, stop the engine and investigate. The desired coolant and oil temperatures may be obtained by operating the radiator air scoop. The control for the scoop is located on the control pedestal at the left side of the seat. The scoop is hydraulically operated by merely moving the radiator air control handle to the desired position.

5. TESTING.

Make the following checks:

a. Check the instruments for the following engine limitations:

	Desired	*Maximum*
Oil Pressure	60-70 lb/sq in.	85 lb/sq in.
Oil Temp	60°-80°C (146°-176°F)	95°C (203°F)
Coolant Temp	105°-115°C (221°-239°F)	125°C (257°F)
Fuel Pressure	12-16 lb/sq in.	16 lb/sq in.

b. Check the magnetos at 2200 rpm and 30-inch Hg manifold pressure. To obtain this power setting, open the throttle to approximately 29-inch Hg manifold pressure and decrease rpm by manual operation of the propeller selector switch, then return the switch to "FIXED PITCH." A maximum loss of 80 rpm on either magneto is allowable. This check should be made in as short a time as possible.

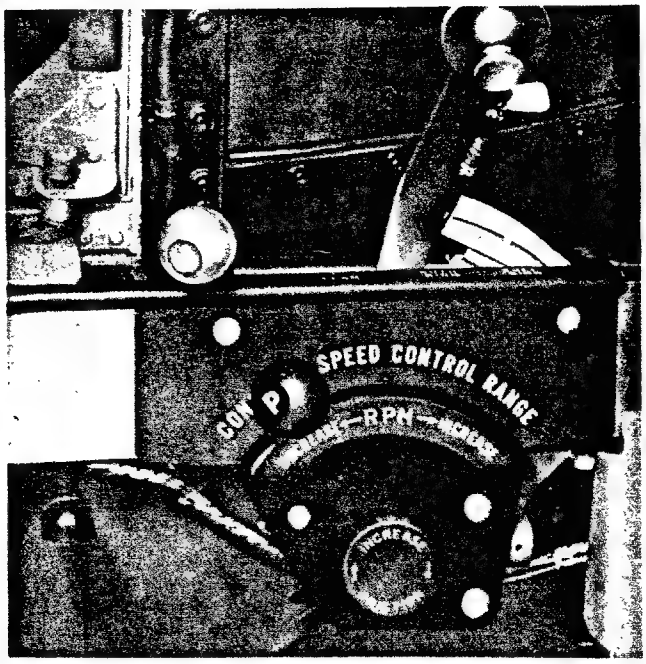


Figure 15—Control Quadrant

c. Press the propeller selector switch back to the "AUTO CONSTANT SPEED" position and move the propeller governor control to see that there is a change in rpm. Then move the control forward to the full "INCREASE RPM" position.

d. With the propeller in full "INCREASE RPM," check the automatic manifold pressure regulator. Open the throttle to 2400 rpm and note the manifold pressure. Change the engine speed from 2400 rpm to 2000 rpm by moving the propeller control toward "DECREASE RPM." The manifold pressure should remain constant within 1-inch Hg.

e. While the engine is warming, test the operation of the flaps with the engine-driven hydraulic pump. Check the hydraulic pressure gage for a pressure indication of 1000 pounds.

f. FLIGHT INDICATOR.—Ascertain that the artificial horizon is caged and that the engine-driven suction pump is producing between 3.75- and 4.25-inch Hg vacuum pressure. Line up the adjustable airplane silhouette with the center of the caged horizon.

g. RADIO.—Recheck the signal-to-noise ratio of the radio receiver with the engine running, in accordance with instructions contained in section 4.

h. MISCELLANEOUS.—Having observed that the oil pressure does not exceed 85 pounds, decrease the engine revolutions gradually to 2000 rpm, and confirm the following:

(1) That the ammeter registers no more than 100 amperes.

(2) That the suction pump registers no more than 4.25 inches Hg.

(3) That the fuel pressure gage registers no more than 16 pounds, no less than 12 pounds.

(4) That each position of both fuel selector valves functions properly.

i. Be sure that the cockpit hood is closed and locked.

j. Check the operation of all surface controls.

k. Set the rudder trim 5 degrees to the right. Set the elevator trim 3 degrees back.

6. TAXIING.

Proceed with the following:

a. Adjust the radiator air scoop to obtain the desired oil and coolant temperatures.

b. For ordinary taxiing, the following generalities should be observed:

(1) Taxi with the stick slightly aft of neutral. This will lock the tail wheel. In the locked position, the tail wheel may be turned 6 degrees to the right or left by use of the rudder pedals. FOR SHARP TURNS, PUSH THE STICK FORWARD OF THE NEUTRAL POSITION. This will unlock the tail wheel and allow full swiveling action.

(2) Use the brakes as little as possible and always taxi cautiously.

(3) Steer a zigzag course in order to survey the area otherwise obstructed by the engine.

(4) On reaching the take-off position, stop the airplane crosswind so that approaching airplanes may be plainly seen.

7. TAKE-OFF.

When the field is clear, quickly check the following:

a. See that the fuel booster pump is "ON."

b. See that the mixture control is in the "AUTO-RICH" position.

c. See that the propeller control is fully forward in the "INCREASE RPM" (low pitch) position, and the propeller selector switch is in the "AUTO CONSTANT SPEED" position. Depress the propeller circuit breaker button.

d. Ascertain that the main system fuel selector valve is in the "LEFT" position (if the left tank contains sufficient gas) and the auxiliary system fuel selector valve is "OFF." (The reason for use of LEFT tank for start and take-off is explained in paragraph 3. *b.* of this section.)

e. See that the generator disconnect switch is turned to "ON."

f. Open the radiator air scoop as required.

g. Check for:

Minimum Oil Temperatures	20°C (68°F)
Maximum Oil Pressure	85 pound/square inch
Minimum Coolant Temperature	85°C (185°F)

h. If high obstacles are to be cleared and only a short run is available, set flaps at 20 degrees down. Take-off position or 20 degrees down position is marked beside the flap control handle and is selected and locked by moving the flap control handle to the desired position.

i. Open the throttle to 52 inches Hg manifold pressure and take off at 3000 rpm (5 minutes maximum).

j. Do not attempt to lift the tail too soon as it increases the torque action.

8. ENGINE FAILURE DURING TAKE-OFF.

If the engine fails immediately after the take-off, act quickly as follows:

a. Maintain speed by depressing the nose at once so that the air speed does not drop below 110 mph.

b. Release the cockpit enclosure by pulling the emergency release located on top of the longeron just to the right of the instrument panel.

c. Make sure that the landing gear has started to come up. There is no time to take further action; and even if it is only unlocked and on the way up, the gear will collapse on landing. Do not try to lower it. There is less likelihood of personal injury if the airplane is landed with the landing gear up.

d. Lower the flaps fully if possible.

e. Land straight ahead, only changing direction sufficiently to miss obstructions.

f. If there is time, switch off the engine to reduce the risk of fire. In any case, do it after landing, and turn the fuel selector valve to "OFF."

g. After landing, get out of the airplane as quickly as possible and remain outside.

9. CLEARING THE FIELD.

Follow this procedure:

a. As soon as the airplane is sufficiently clear of the ground, retract the landing gear by pulling the landing gear control handle inboard and up. The handle is located on the control pedestal to the left and just forward of the seat. Observe the landing gear position from the electrical indicator located on the left side of the instrument panel.

b. If the flaps have been partly lowered for the take-off, raise them provided that the air speed is at least 110 mph and all obstacles sufficiently cleared. Raising the flaps is accomplished by pulling the flap control to the fully up position. No sinking is noticeable when the flaps are raised.

c. Check the coolant and oil temperature together with the oil pressure.

d. Turn the fuel selector valve to the desired tank.

WARNING

Ascertain that the selector valve for the fuel system not being used is in the "OFF" position. The engine will not run if either selector valve is set on an empty tank.

10. CLIMBING.

As the rate of climb can vary widely depending on weight, external loading, and altitude, refer to the "Climb Control Charts" in section 3 for the rate of climb applicable to the particular mission to be employed.

11. CRUISING.

Consult the cruising charts in section 3 and make the following checks:

a. Check for the following desired instrument readings:

Coolant Temperature	105°-115°C (221°-239°F)
Oil Temperature	60°-80°C (176°F)
Oil Pressure	60-70 lb/sq in. (Min 55 lb/sq in.)
Fuel Pressure	17 ± 1 lb/sq in.

b. If auxiliary fuel tanks are installed, use the fuel from them first and shift from the left tank to the right tank as desired to prevent excessive wing heaviness. When the main fuel system is in operation, use the fuel from the left and right fuel tanks alternately. Ascertain that one selector valve control is off when the other is in use.

The fuel booster pump should be turned off for most conditions of cruising flight. This saves wear and tear on the pump and keeps it in good condition for emergency use. General rules for the use of the booster pump are as follows:

During starting—to get initial fuel pressure.

During take-off—for high fuel flow and safety.

During climb—for high fuel flow and prevention of bubbles with hot fuel.

During war emergency power operation—for high fuel flow.

During cruising conditions — usually not needed. Turn it off unless sudden combat is anticipated.

During high altitude operation—to maintain pressure (particularly if fuel was hot at take-off).

During use of combat droppable or ferrying tanks—if needed to maintain pressure.

During landing approach—for safety.

Emergency — in case the engine-driven fuel pump fails.

12. GENERAL FLYING CHARACTERISTICS.

a. ENGINE.

(1) OPERATING CONDITIONS.— Normal engine operating conditions are adequately covered in the charts of section 3.

(2) USE OF WAR EMERGENCY RATINGS.

(a) The basis for establishing War Emergency

Ratings given in Section 3 is to make available to a pilot in combat the absolute maximum manifold pressure at which the engine may be operated, with reasonable safety limits, for a 5-minute period under emergency conditions.

(b) These War Emergency Ratings are considerably in excess of the ratings given in the engine specification under which the engines were delivered and the use of War Emergency Ratings will probably decrease the normal service life and time obtained between overhaul. War Emergency Rating operation should, therefore, be held for use only where emergency conditions exist. War Emergency Ratings are not guaranteed power ratings but rather maximum manifold pressure ratings available for emergency operation only as established by the correct setting of the automatic manifold pressure regulator, and ability of the propeller and propeller governor to control to 3000 rpm.

(3) War Emergency Ratings are to be used only when strict compliance to each of the following conditions are met:

(a) In combat or precombat areas as designated by the Army Air Forces and then only when emergency conditions exist.

(b) Only when Specifications No. AN-VV-F-781 Amendment No. 5 fuel is used.

(c) The mixture control must be set in "AUTO-RICH." "FULL RICH" must *never* be used except in case of an *emergency.*

(d) The following spark plugs must be used: Champion C35S or C34S, or AC L885.

(e) Only when an automatic manifold pressure regulator is installed on the engine and the control setting suitably modified. (The modification is covered in T. O. No. 03-10HA-5.)

(f) The engine throttle quadrant must incorporate a "break-through seal" device. A break-through of the seal as mentioned above will call attention of the crew chief to the fact that the engine has been operated at War Emergency Ratings and he will make such special inspections and checks as will be later specified. Close coordination between the pilot, crew chief, and engineering officer will be required to keep an accurate record of the amount of time any engine has operated at War Emergency Rating conditions. When 5 hours' time has accumulated the engine should be pulled for tear-down inspection and reconditioning.

NOTE

The amount of time an engine will stand up under the use of War Emergency Ratings will vary considerably dependent upon the area in which the airplane is located, that is, operation in areas having sandy runways will be less than from operation off concrete runways. Variations will also be noticeable between extremely cold, moderate, and hot climates. The engineering officer will have to take these factors into consideration in establishing the total time at War Emergency Rating operating condition when engines should be removed. Close correlation with the experience of engineering officers in other areas will be valuable.

Engines must be carefully maintained and checked out for satisfactory operations under current operating instructions prior to their being considered satisfactory for the use of War Emergency Ratings in case of emergencies.

(g) All operations for War Emergency Ratings must be with the propeller control set in "AUTO CONSTANT SPEED" position to maintain 3000 rpm.

(h) During the use of War Emergency Ratings, use Specification No. AN-VV-O-446 lubricating oil, the following oil inlet temperatures must not be exceeded: 95°C (203°F) with grade 1120, 85°C (185°F) with grade 1100.

CAUTION

If oil dilution has been used, it is desirable that the engine be given 10 to 15 minutes operation at from 80 percent normal to military power prior to the use of War Emergency Ratings.

(i) During the use of War Emergency Ratings the coolant system should be filled with ethylene glycol to AN-E-2 Specification and the coolant outlet temperature should not be permitted to exceed 125°C (257°F).

b. AIRPLANE.

(1) STABILITY.—The airplane is stable at all normal loadings but the directional trim changes at low speeds as speed and horsepower output is varied. The rudder tab is effective and should be used as necessary.

(2) Wing flaps must not be fully lowered when the airplane is being flown in excess of 165 mph IAS.

(3) Landing gear must not be lowered when the airplane is being flown in excess of 170 mph IAS.

(4) The effect of flap and landing gear operation on the trim of the airplane in flight is as follows:

(a) Landing gear retracted — airplane becomes tail heavy.

(b) Landing gear extended — airplane becomes nose heavy.

(c) Flaps lowered—airplane becomes nose heavy.

(d) Flaps raised—airplane becomes tail heavy.

(e) Flaps raised at 110 mph—no apparent sink.

(5) The following flap setting air-speed restrictions must be observed:

(a) With wing flap setting at 10 degrees do not exceed 400 mph IAS.

(b) With wing flap setting at 20 degrees do not exceed 275 mph IAS.

(c) With wing flap setting at 30 degrees do not exceed 225 mph IAS.

(d) With wing flap setting at 40 degrees do not exceed 180 mph IAS.

(e) With wing flap setting at 50 degrees do not exceed 165 mph IAS.

(6) The tab controls are sensitive and must be used with care.

(7) Care must be taken while sideslipping that the air speed does not fall below 110 mph; however, a sustained sideslip cannot be performed in this airplane. Recovery from a sideslip should be effected above 200 feet.

13. STALLS.

Though the stall most commonly occurs at low speed, it should be remembered that it may occur at any speed if the control stick is brought back far enough to put the airplane at stalling incidence. The following is a brief description of the stalling characteristics of this airplane:

a. With flaps and landing gear up, the stalling incidence is reached at about 85 mph indicated, when a wing will drop. If the wing drops and backward movement on the stick continues, the airplane will fall into a steep spiral.

b. With the flaps and landing gear down, the stalling incidence is reached at about 90 mph indicated. As speed is reduced, a wing will drop rather slowly; and unless recovery is effected immediately, the airplane will fall into a steep spiral. An indicated speed of 165 mph should not be exceeded with the flaps fully down.

c. The stall in this airplane is comparatively mild in that it does not whip at the stall but rolls rather slowly and has very little tendency to drop into a spin. If the stick and rudder are released at the stall, the nose drops sharply and it recovers from the stall almost instantly. In a straight power-off stall, some warning is given about three to four mph above the stall by slight elevator buffet. A high-speed stall is preceded by sharp buffeting at the elevators and wing root, but recovers immediately when pressure on the stick is released.

d. Recovery from any stall in this airplane is entirely normal, that is, by the release of back pressure on the stick and the application of rudder opposite from the dropping wing.

14. SPINS.

a. DIFFERENCES.—There is a marked difference between a sustained left and right spin in this airplane. The differences are as follows:

(1) The left spin oscillates from 80 degrees below the horizon back to the horizon during the first turn, dampens out 50 percent during the second turn, and then becomes stable, smooth, and quiet with the nose approximately 30 degrees to 40 degrees below the horizon.

(2) The right spin starts exactly the same as the left spin, but the oscillations continue without increasing or decreasing in magnitude.

b. RECOVERY.—Recovery is the same in both a left and right spin. Upon application of opposite rudder, the nose drops slightly and the spin speeds up rapidly for one and one-quarter turns, after which the spin stops. Rudder force is light at first, becomes very heavy for a period of about 1 second at the first half turn after starting recovery, then drops to zero as the spin stops. Recovery is effected in the normal manner, that is, by applying full opposite rudder followed by movement of the stick to neutral.

NOTE

Slight rudder buffet occurs during the spin. If recovery from the dive is attempted too soon after stopping the spin, a rather heavy elevator and rudder buffet will occur.

15. ACROBATICS.

The acrobatic qualities of this airplane are exceptional, and the lateral control is excellent at all speeds. All normal acrobatics are permitted; however, inverted flying must be limited to 10 seconds because of loss of oil pressure and failure of the scavenger pump to operate in inverted position.

16. DIVING.

The maximum permissible diving speed is 505 mph IAS, during which the engine must not exceed 3120 rpm. During a dive in which high power is used, it is not necessary to pull back the propeller control; however, if diving at reduced throttle, the propeller should be set

at 2300 rpm to prevent exceeding 3120 rpm. The use of elevator tabs is not required for dive recovery because of the low elevator control forces.

WARNING

This airplane gains speed very quickly in a dive. Before diving be sure there is ample altitude available for a safe recovery.

17. GLIDING.

Gliding may be carried out at any safe speed down to the recommended margin of about 25 percent above stalling speed. With the landing gear and flaps up, the glide is fairly flat with the nose very high. Forward visibility in this condition is poor. Lowering either the flaps or landing gear, or both, greatly steepens the gliding angle for a given speed and the rate of descent is much increased. The following speeds are subject to ± 5-mph, depending on loading:

a. Best gliding speed—landing gear and flaps UP—approximately 140 rpm IAS.

b. Best gliding speed—landing gear and flaps DOWN—approximately 125 to 135 mph IAS. (Not necessary for final straight approach. See paragraph 23 of this section, "LANDING.")

c. Engine assisted glide—landing gear and flaps DOWN—100 to 110 mph IAS.

18. ENGINE FAILURE DURING FLIGHT.

In the case of total engine failure, release the cockpit enclosure by pulling the emergency release on the top of the longeron just to the right of the instrument panel. Land with the gear in the retracted position. The flaps may be lowered as desired; but it should be kept in mind that, after loss of hydraulic pressure, the flaps must be lowered by use of the hydraulic hand pump, and actuating the flaps by this method is rather slow.

19. RAIN OR POOR VISIBILITY.

When flying in conditions of bad visibility, open the clear vision panel in the left side of the windshield. As a negative pressure area exists at this point, the elements will not enter the cockpit. If moisture or frost forms on the inside of the windshield, turn on the defroster system by turning the knob marked "DEFROSTER" which is located on the hot-air valve to the right of the control stick. If ice forms on the outside of the windshield, use the de-icer system by holding in the knob marked "WINDSHIELD DE-ICER SPRAY" on the upper right of the instrument panel. Since the de-icer system uses glycol from the the engine coolant system, it should be

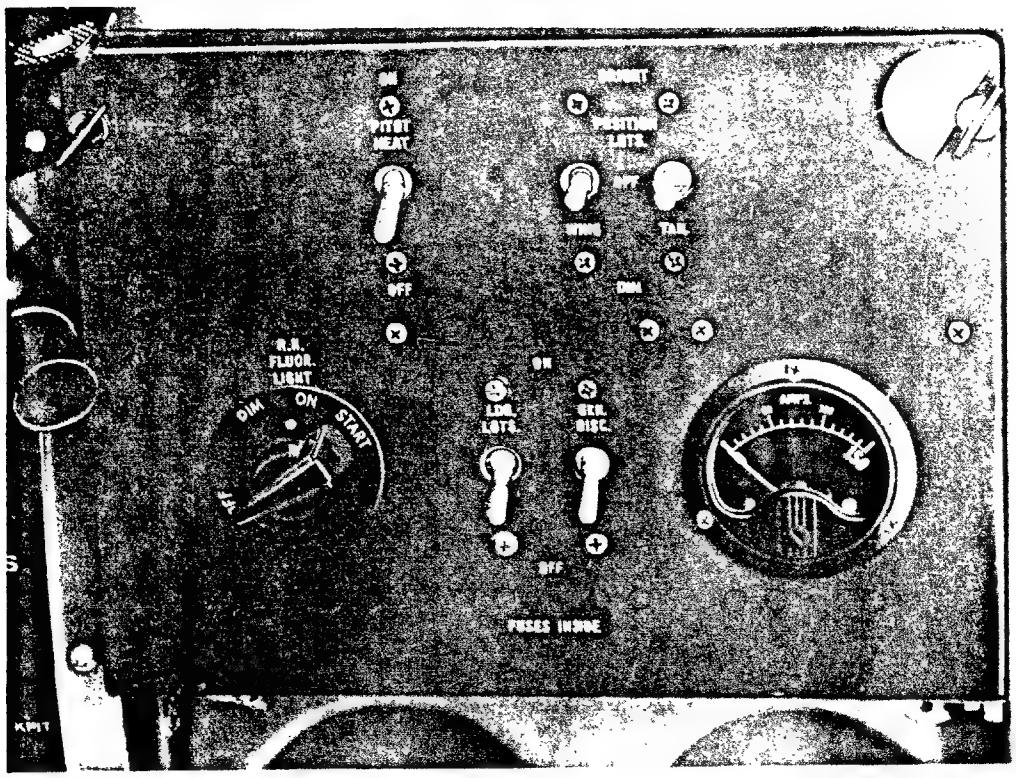


Figure 16—Right Switch Panel

used sparingly. In rain or icing conditions, the alternate source for furnishing air to the carburetor should be used by pulling out and locking the control marked "CARBURETOR AIR" on the left of the instrument panel. If icing conditions become severe and ice has formed in the carburetor, the carburetor heat control located on the left side of the instrument panel of P-51A-2 and P-51A-5 and P-51A-10 airplanes should be used. Flying speed may be reduced during poor visibility by retarding power and rpm and by partly lowering the flaps.

20. NIGHT FLYING.

For flying this airplane at night, the sequences outlined for daylight operation should be even more strictly observed. Make the following preparations:

a. Switch on the two cockpit lights located on each side of the cockpit by turning the knob at the base of the light.

b. Turn on the ultraviolet fluorescent spotlights above and to each side of the instrument panel by means of the rheostat knobs located one on the pilot's forward switch panel, and one on the right-hand switch panel. The fluorescent lights are mounted on toggle joints to permit flexibility of movement. The front section of the lamp housing is rotatable, permitting varying intensity of visible light and also an even beam of ultraviolet.

c. Switch on the position lights. The switches are on the right-hand switch panel. There are two intensities available, "BRIGHT" and "DIM."

d. Switch on the compass light by rotating the rheostat located on the pilot's switch panel. Adjustment of the intensity of the light should be made to give sufficient illumination for night operation.

e. Switch for the landing light, is on the right-hand switch panel.

f. A switch and rheostat for the gun sight is located on the pilot's switch panel.

Get used to the position of the various lights by feel, especially the switch for the landing lights.

NOTE

In case of a bulb burning out, spares may be obtained from the small compartment on the right forward side of the cockpit. Spare fuses are mounted in the right-hand switch panel and are of various capacities. Each is held by a fuse clip and marked as to capacity.

21. EMERGENCY EXIT.

The cockpit enclosure may be released as a unit for emergency exit. The emergency exit control handle is located on the right forward side of the cockpit. To release the hood, pull the handle back all the way. This releases the enclosure hinge cams which force the enclosure up and into the slip stream. If the force of the air does not pull the enclosure from the airplane, apply a straight upward push to the roof of the hood. In the event of a crash landing and the attitude of the airplane is such that it is resting on the nose-over structure, pull back on the emergency release handle and push outward on the left panel.

22. APPROACH.

When the airplane nears the field:

a. Turn the fuel selector valve to the desired tank.

b. Turn on the fuel booster pump.

c. Set the propeller selector at 2600-rpm with the propeller switch at "AUTO CONSTANT SPEED."

d. Set the mixture control to "AUTO-RICH."

e. Adjust the radiator air scoop as desired.

f. Adjust the power and trim to maintain 150-mph in level flight.

g. Switch off the gun heater if used.

h. Lower the landing gear by pulling the landing gear handle inboard and pushing it down. Upon full extension of the landing gear, spring-loaded steel pins will drop behind the extended members and lock them securely in the extended position. The position of the landing gear should be checked by the electrical indicator located on the left lower side of the instrument panel. On the P-51A-2, P-51A-5, and P-51A-10, an additional warning light is on the left side of the instrument panel. This light will indicate an unsafe position of the landing gear when the throttle is retarded for a landing.

NOTE

Always complete the extension cycle of the landing gear before placing the landing gear selector valve in the "UP" position to prevent interference between the fairing door and the landing gear.

i. If desired, the flaps may be lowered 15 degrees to give a steeper approach angle. When the airplane has been brought into the wind for landing, the flaps should be lowered fully at an altitude of at least 400 feet, provided the indicated air speed is above 100 mph. To lower the flaps, push the flap control handle to the desired position as marked.

23. LANDING.

Having turned into the field and lowered the flaps, maintain a correct gliding speed of between 105 to 110 mph. Adjust the elevator trim tab to assist in landing. Having stopped after landing, raise the flaps and turn off the fuel booster pump.

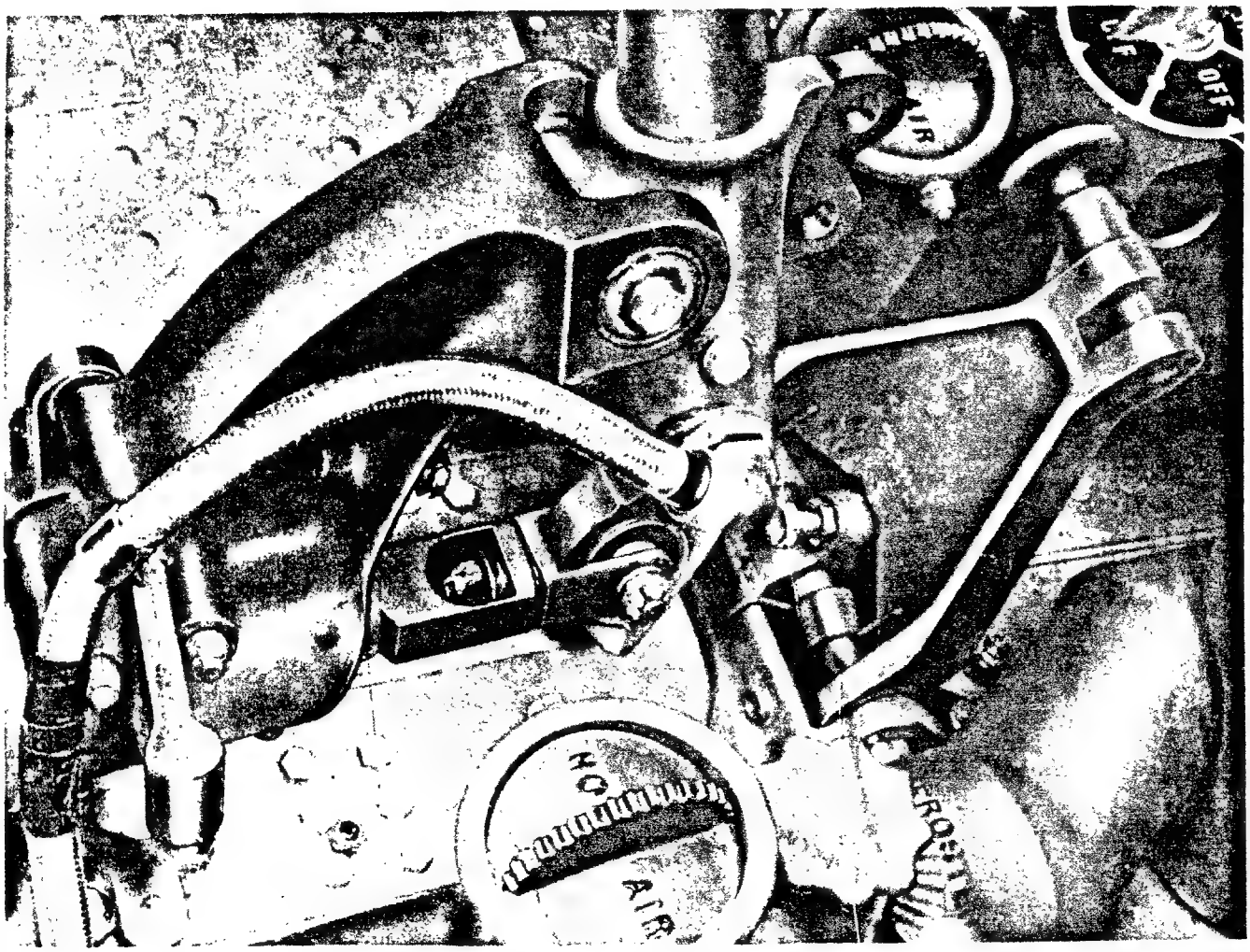


Figure 17—Control Lock

a. MISLANDING.—In the case of an unsuccessful attempt to land, open the throttle; then push the propeller control forward to "INCREASE RPM." Raise the landing gear immediately; then, when the air speed has reached 110 mph, raise the flaps.

b. CROSS-WIND LANDING.—As this airplane has a landing gear of wide tread and a locked tail wheel, cross-wind landings may be negotiated safely. Keep one wing down, into the wind, to counteract drift.

c. EMERGENCY OPERATION OF LANDING GEAR.—In the event of a complete hydraulic failure when the landing gear is in the retracted position, proceed as follows:

(1) Place the landing gear control handle in the down position. The tail wheel will drop and lock of its own weight. The main landing gear will partially drop of its own weight.

(2) Yaw the airplane to the left by use of the rudder. The air load against the left gear fairing will down and lock the gear. Repeat the process to the right to down and lock the right gear.

(3) After the landing gear has dropped downward, check the position of the landing gear and the downlockpins by observing the electrical position indicator on the left side of the instrument panel.

(4) The landing gear doors will remain down but will not be noticeable except when landing in a cross-wind.

24. STOPPING THE ENGINE.

When the airplane has stopped rolling, proceed with the following:

a. If a cold weather start is anticipated, press the oil

dilution switch to "ON" and dilute the oil system for 4 minutes at 800 rpm. If the engine temperature is excessive, the fuel will evaporate out of the oil and leave high viscosity oil in the engine. When this condition is encountered, shut off the engine and allow it to cool for 15 minutes or until it is still just warm enough to start again easily. Then restart and dilute again. This may have to be repeated once or twice in order to insure retention of sufficient diluting fuel in the oil system for an easy start in extremely cold climates.

b. Set the mixture control in the "IDLE CUT-OFF" position at 1200 rpm and move the throttle fully open.

c. Turn the ignition switch to the "OFF" position after the engine ceases firing.

d. Turn both fuel selector valves to "OFF."

e. Leave the mixture control lever at "IDLE CUT OFF" as a precaution against accidental starting.

25. BEFORE LEAVING COCKPIT.

Before leaving the cockpit, make a general survey of the compartment and proceed as follows:

a. Apply the parking brake.

WARNING

IF BRAKES ARE HOT AS A RESULT OF FREQUENT OPERATIONS, WAIT UNTIL COOL BEFORE APPLYING PARKING BRAKE; OTHERWISE BRAKE DISCS WILL ADHERE TO EACH OTHER.

b. Lock the control surfaces. The lock is located just forward of the control stick.

c. Turn off the generator disconnect switch, all radio switches, and all light switches.

26. MANEUVERS PROHIBITED.

All normal maneuvers are permitted with this airplane except when external fuel tanks or bombs are installed. With the 150-gallon ferrying tanks installed, all maneuvers are prohibited and the stalling speed of the airplane is increased 10 mph.

SECTION 3
FLIGHT OPERATION DATA

1. DETERMINING GROSS WEIGHT.

Refer to the "WEIGHT AND BALANCE CHART" in this section and check the listed basic and alternate tabulated items against those loaded in the airplane. If the airplane is loaded in accordance with the "Basic Load Items" whose weights are entered in the "Pounds" column, and the "Alternate Items" whose weights are entered under four loading conditions in the "Alternate Loading (Pounds)" column, the gross weight will be found listed at the bottom of the chart. If any items tabulated in the "Pounds" column are omitted in the loading of the airplane, deduct the weight of the missing items from the "Gross Weight," and the resulting figure will be the correct gross weight as the airplane is actually loaded.

2. FLIGHT PLANNING.

a. GENERAL.

(1) A series of charts on the following pages is provided to aid in selecting the proper power and altitude to be used for obtaining optimum range of the airplane. A chart is provided for each loading of the airplane and the probable range of gross weight. Separate charts are provided for statute or nautical miles.

(2) If the flight plan calls for a continuous flight where the desired cruising power and air speed are reasonably constant after take-off and climb and the external load items are the same throughout the flight, the fuel required and flight time may be computed as a "single section flight." If this is not the case, the flight should be broken up into sections, and each leg of the flight planned separately since dropping of external bombs or tanks causes considerable changes in range and air speed for given power. (Within the limits of the airplane, the fuel required and flying time for a given mission depend largely upon the speed desired. With all other factors remaining equal in an airplane, speed is obtained at a sacrifice of range, and range is obtained at a sacrifice of speed.)

b. USE OF CHARTS.

(1) Although instructions for their use are shown on the "FLIGHT OPERATION INSTRUCTION CHARTS," the following expanded information on proper use of the charts may be helpful.

(2) Select the "FLIGHT OPERATION INSTRUCTION CHART" for the model airplane, gross weight and external loading to be used at take-off. The amount of gasoline available for flight planning purposes depends upon the reserve required and the amount required for starting and warm-up. The fuel required for warm-up is set forth on the chart. Reserve should be based on the type of mission, terrain over which the flight is to be made, and weather conditions. The fuel required for climb and time to climb to various altitudes is shown on the "TAKE-OFF, CLIMB AND LANDING CHART." Fuel remaining after subtracting reserve, warm-up, and climb fuel from total amount available is the amount to be used for flight planning.

(3) Select a figure in the fuel column in the upper section of the chart equal to, or the next entry less than, the amount of fuel available for flight planning. Move horizontally to the right or left and select a figure equal to, or the next entry greater than, the distance (with no wind) to be flown. Operating values contained in the lower section of the column number in which this figure appears, represent the higher cruising speeds possible at the range desired. It will be noted that the ranges listed in column I under "Maximum Continuous Power" are correct only at the altitude shown by the note on the chart for this column. The ranges shown in column II and other columns to the right of column II can be obtained at any of the altitudes listed in the "Density Altitude" column. All of the power settings listed in a column will give approximately the same number of miles per gallon if each is used at the altitude shown on the same horizontal line with it. Note that the time required for the flight may be shortened by selection of the higher altitudes. In long range cruising it is important that altitude air speed and rpm be held constant. The manifold pressure should be changed as required to hold the above values reasonably constant. A flight duration may be calculated by dividing the true air speed of the flight altitude into the air miles to be flown.

(4) The flight plan may be readily changed at any time enroute, and the chart will show the balance of range available at various cruising powers by following the INSTRUCTIONS FOR USING CHART printed on each chart.

IMPORTANT

The above instructions and following charts do not take into account the effect of wind. Adjustments to range values and flight duration to allow for wind may be made by any method familiar to the pilot such as by the use of a flight calculator or a navigator's triangle of velocities.

c. SAMPLE PROBLEM.

(1) To ferry a P-51A Airplane 1700 nautical (1960 statute) miles over water, cruising at 8,000 ft. altitude, the flight should be planned as follows:

(a) Reference to the charts indicates that two 150-gallon ferrying tanks are required.

(b) Allowing 15 gallons for warm-up, take-off, and climb as noted, 465 gallons (including two 150-gallon ferrying tanks) are left for flight.

(c) The range shown in column IV is 2080 nautical (2400 statute) miles which gives 380 nautical (440 statute) miles reserve.

(d) Vertically below in the table and opposite 9000 ft. (since 8000 ft. is not listed) read 2200 RPM, 220 knots IAS (240 knots TAS) with 32 inches Hg MP and 54 GPH fuel flow. AUTO LEAN mixture must be used since the figures are in light type. Range to be covered, divided by TAS, equals hours of flight (1700 divided by 240 equals 7.12 hours). Hours multiplied by fuel flow equals gallons consumed (7.12 times 54 equals 384 gallons). Gallons at start minus gallons at finish equals gallons reserve (465 minus 384 equals 81 gallons reserve).

(2) As an alternate plan, reference to column V for maximum range at extreme right of chart shows that the flight may be made with a sacrifice of 40 to 45 knots speed if 680 nautical (780 statute) miles reserve are desired. The conditions for this plan are 1650 RPM and 180 knots IAS (200 knots TAS), with 30 in. Hg MP and 39 US GPH fuel flow. Under this plan, it will be noticed that the time required for the flight is 8.5 hours, or an increase of 1.38 hours over problem (1). It will also be noticed that the fuel consumed will be 331 gallons, or a decrease of 53 gallons. This will give a reserve of 134 gallons as against 81 gallons in problem (1).

(3) If, at any time during a flight, weather conditions require a change in altitude, the pilot need only proceed to the altitude at which flight is necessary, and read the engine operating conditions and fuel consumed opposite the altitude. It is only necessary that the pilot remain in the same column at which the flight was begun. Thus, by changing from one altitude to another during a flight, the fuel reserve should remain the same; the total flight time will be approximately the same depending on the time the change of altitude was made, noting only a slight increase or decrease of hours.

NOTE

Removing bomb racks increases maximum speed approximately 15 miles per hour.

SPEC. AN-H-8
DEC. 18, 1942
FORM ASC-513

WEIGHT & BALANCE CHART

AIRPLANE MODELS	CONDITION	CG LIMITS (IN INCHES) AFT OF REFERENCE DATUM LINE F'W'D	AFT
P-51A-1-NA, P-51A-2-NA	TAKE-OFF		102.2
P-51A-5-NA, P-51A-10-NA	LANDING	95.8	

BASIC WEIGHT ITEMS	POUNDS
WEIGHT EMPTY (INCLUDING TRAPPED FUEL AND OIL)	6510
EQUIPMENT:	
NAVIGATION ____ LB. PHOTOGRAPHIC ____ LB. OXYGEN ____ LB.	
PYROTECHNICS (FLARES, ETC.) 9 LB.	10
ARMAMENT:	
FIXED GUN INSTALLATION(S): (4) .50 CAL. 276 LB.; ( ) ____ CAL. ____ LB.; GUN SIGHT 4 LB.	280
FLEXIBLE GUN INSTALLATION(S): ( ) ____ CAL. ____ LB.; ( ) ____ CAL. ____ LB.	
CANNON INSTALLATION(S): ( ) ____ MM. ____ LB.; ( ) ____ MM. ____ LB.	
RADIO: MODEL(S) SCR-522-A OR SCR-274-N WITH SCR-695-A OR SCR-515-A INCLUDED IN WEIGHT EMPTY	
TOTAL BASIC WEIGHT (CG 97.8 INCHES AFT OF REFERENCE DATUM LINE)	6800

ITEMS OF USEFUL LOAD	U.S. GAL.	(IMP. GAL.)	ALTERNATE LOADINGS (POUNDS) NORMAL FUEL	FULL FUEL	COMBAT FUEL	MAXIMUM BOMBS	FERRYING
PILOT (200 LB. INCLUDING PARACHUTE)			200	200	200	200	200
CREW (200 LB. EACH INCLUDING PARACHUTE)							
PASSENGERS (200 LB. EACH INCLUDING PARACHUTES)							
BAGGAGE (____ LB. MAXIMUM)							
FUEL (6 LB/U.S. GAL. OR 7.2 LB/IMP. GAL.):							
WING TANKS, NORMAL	105	(90)	630				
WING TANKS, FULL	180	(150)		1080	1080	1080	1080
DROPPABLE COMBAT TANKS	150	(125)			900		
DROPPABLE FERRYING TANKS	300	(250)					1800
		( )					
		( )					
OIL (7.5 LB/U.S. GAL. OR 9 LB/IMP. GAL.):		( )					90
OIL, NORMAL	7.5	(6)	60				
OIL, FULL	12	10		90	90	90	
EXTRA TANK(S) INSTALLATION DROPPABLE TANKS					100		220
BOMB INSTALLATION(S): ( ) INTERNAL AT ____ LB. EACH							
MAXIMUM (2) EXTERNAL AT 500 LB. EACH						1000	
BOMB RACKS					20	20	20
TORPEDO INSTALLATION							
AMMUNITION							
FULL (1260) RD. OF .50 CAL.; ( ) RD. OF ____ CAL.				380	380	380	
( ) RD. OF ____ MM.; ( ) RD. OF ____ MM.							
NORMAL (800) RD. OF .50 CAL.			240				
EQUIPMENT CARRIED IN FERRYING							80
GROSS WEIGHT			8000	8600	9600	9600	10,300
DISTANCE (IN INCHES) THAT CG IS AFT OF REFERENCE DATUM LINE			100.9	102.2	101.8	101.6	101.3

SPEC. AN-H-8 DEC. 18, 1942 FORM ASC-513

WEIGHT & BALANCE CHART

AIRPLANE MODELS	CONDITION	CG LIMITS (IN INCHES) AFT OF REFERENCE DATUM LINE F'W'D	AFT
P-51A-3-NA	TAKE-OFF		102.2
(P-51A MODIFIED FOR 2 K-24 CAMERAS)	LANDING	95.8	

BASIC WEIGHT ITEMS	POUNDS
WEIGHT EMPTY (INCLUDING TRAPPED FUEL AND OIL & RADIO)	6500
EQUIPMENT:	
NAVIGATION ____ LB. PHOTOGRAPHIC ____ LB. OXYGEN ____ LB.	
2 K-24 CAMERAS & INTERVALOMETER	60
PYROTECHNICS (FLARES, ETC.) 9 LB.	10
ARMAMENT:	
FIXED GUN INSTALLATION(S): (4) .50 CAL. 276 LB.; ( ) ____ CAL. ____ LB.; GUN SIGHT 4 LB.	280
FLEXIBLE GUN INSTALLATION(S): ( ) ____ CAL. ____ LB.; ( ) ____ CAL. ____ LB.	
CANNON INSTALLATION(S): ( ) ____ MM. ____ LB.; ( ) ____ MM. ____ LB.	
RADIO: MODEL(S) SCR-522 & SCR-695 INCLUDED IN WEIGHT EMPTY	
MOUNTS & PROVISIONS FOR 2 K-24 CAMERAS	30
TOTAL BASIC WEIGHT (CG 98.2 INCHES AFT OF REFERENCE DATUM LINE)	6900

ITEMS OF USEFUL LOAD	U.S. GAL.	(IMP. GAL.)	ALTERNATE LOADINGS (POUNDS) NORMAL FUEL	*FULL FUEL	*COMBAT FUEL	FERRYING
PILOT (200 LB. INCLUDING PARACHUTE)			200	200	200	200
CREW (200 LB. EACH INCLUDING PARACHUTE)						
PASSENGERS (200 LB. EACH INCLUDING PARACHUTES)						
BAGGAGE (____ LB. MAXIMUM)						
FUEL (6 LB. U.S. GAL. OR 7.2 LB. IMP. GAL.):						
WING TANKS, NORMAL	105	(90)	630			
WING TANKS, FULL	180	(150)		1080	1080	1080
DROPPABLE COMBAT TANKS	150	(125)			900	
DROPPABLE FERRYING TANKS	300	(250)				1800
		( )				
		( )				
OIL (7.5 LB/U.S. GAL. OR 9 LB/IMP. GAL.):	8	(6.7)	60	60	60	60
EXTRA	4	(3.3)		30	30	30
EXTRA TANK(S) INSTALLATION COMBAT-120; FERRYING-240					120	240
BOMB INSTALLATION(S): ( ) INTERNAL AT ____ LB. EACH						
( ) EXTERNAL AT ____ LB. EACH						
TORPEDO INSTALLATION						
AMMUNITION						
(1260) RD. OF .50 CAL. (FULL)				380	380	
(800) RD. OF .50 CAL. (NORMAL)			240			
MISC. EQUIPMENT CARRIED IN FERRYING						80
GROSS WEIGHT			8100	8700	9700	10,400
DISTANCE (IN INCHES) THAT CG IS AFT OF REFERENCE DATUM LINE			101.6	102.8	102.4	102.1

NOTE: Raising landing gear from down to up position moves CG approx. 0.3" aft.

*Attention is called to the fact that these loadings result in a horizontal CG which exceeds the recommended aft CG limit

SPEC. AN-H-8
DEC. 18, 1942
FORM ASC-512

AIRPLANE MODELS

P-51A-1, P-51A-2

P-51A-5, P-51A-10

SPECIFIC ENGINE FLIGHT CHART

ENGINE MODELS

ALLISON V-1710-81

CONDITION	FUEL PRESSURE (LB/SQ. IN.)	OIL PRESSURE (LB/SQ. IN.)	OIL TEMP. °C	OIL TEMP. °F	COOLANT TEMP. °C	COOLANT TEMP. °F		
DESIRED	12-16	60-70	60-80	140-188	105-115	221-240		
MAXIMUM	16	85	95	202	125	257		
MINIMUM	12	55			85	185		
IDLING	9	15						

MAX. PERMISSIBLE DIVING RPM: 3120

CONDITION	ALLOWABLE OIL CONSUMPTION
NORMAL RATED (MAX. CONT.)	13.3 U.S.QT/HR
MAX. CRUISE	10.0 U.S.QT/HR
MIN. SPECIFIC	5-7 U.S.QT/HR

OIL GRADE: (S) 1120 (W) 1120

SUPERCHARGER TYPE: ENGINE-DRIVEN, SINGLE SPEED, SINGLE STAGE

FUEL GRADE: AN-VV-F-781 AMEND. 5 **OCTANE** 100

OPERATING CONDITION	RPM	MANIFOLD PRESSURE (BOOST)	HORSE-POWER	CRITICAL ALTITUDE WITH RAM	CRITICAL ALTITUDE NO RAM	BLOWER	USE LOW BLOWER BELOW:	MIXTURE CONTROL POSITION	FUEL FLOW (GAL/HR/ENG.) U.S.	FUEL FLOW (GAL/HR/ENG.)	MAXIMUM CYL. TEMP. °C	MAXIMUM CYL. TEMP. °F	MAXIMUM DURATION (MINUTES)
TAKE-OFF	3000	52	1330	14,000	SEA LEVEL			AUTO RICH	157				5
WAR EMERGENCY	3000	57	1470	11,800	SEA LEVEL			AUTO RICH	175				5
MILITARY	3000	44.2	1125	18,000	14,600			AUTO RICH	135				15
NORMAL RATED (MAX. CONT.)	2600	38.3	1000	17,500	13,800			AUTO RICH	115				CONT.
MAXIMUM CRUISE	2280	F.T.	750	19,000	13,800			AUTO LEAN	59				CONT.
MINIMUM SPECIFIC CONSUMPTION	1650	28	370	SEA LEVEL	—			AUTO LEAN	29				
	1650	28	420	5000	—			AUTO LEAN	31				
	1650	28	470	10,000	—			AUTO LEAN	34				
	1650	F.T.	530	15,000	—			AUTO LEAN	38				
	1900	F.T.	510	20,000	—			AUTO LEAN	39				

REMARKS: *MINIMUM SPECIFIC CONSUMPTION DATA ARE AVERAGE CONDITIONS FOR MAXIMUM RANGE.*

SPEC. AN-H-8 Dec. 18, 1942 FORM ASC-510

AIRPLANE MODELS

P-51A-1, P-51A-2

P-51A-5, P-51A-10

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODELS

ALLISON V-1710-81

TAKE-OFF DISTANCE (IN FEET)

GROSS WEIGHT (IN LBS.)	HEAD WIND MPH		HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY					
			AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.	
			GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
8500	0		1150	1800	1350	2000	1600	2300	1250	1850	1400	2050	1650	2350	1400	2050	1650	2300	1950	2650
	17		800	1300	900	1450	1050	1500	850	1350	950	1500	1100	1650	950	1450	1100	1650	1300	1850
	34		500	900	550	950	600	1050	550	900	600	1000	650	1100	600	1000	650	1100	750	1200
	51		280	550	300	600	300	650	300	550	300	600	300	650	350	600	350	650	350	700
9500	0		1500	2200	1750	2450	2050	2800	1600	2300	1850	2550	2150	2950	1900	2550	2150	2900	2600	3350
	17		1050	1650	1200	1800	1400	2000	1150	1700	1250	1850	1500	2100	1300	1900	1500	2100	1750	2400
	34		700	1150	750	1250	850	1350	750	1200	800	1300	900	1400	850	1300	950	1400	1100	1600
	51		400	750	450	800	450	850	450	750	450	800	500	850	500	850	550	900	600	950
10,500	0		1900	2650	2200	3000	2550	3400	2050	2800	2300	3100	2700	3600	2400	3200	2800	3600	3350	4200
	17		1350	2000	1550	2200	1750	2500	1450	2100	1650	2300	1900	2600	1750	2350	2000	2600	2300	3000
	34		900	1400	1000	1550	1100	1700	950	1450	1050	1600	1200	1800	1150	1650	1400	1950	1500	2050
	51		550	950	600	1000	650	1100	600	950	650	1050	700	1100	700	1100	750	1150	850	1300

NOTE: INCREASE DISTANCE 5 % FOR EACH 10°C ABOVE 0°C (5 % FOR EACH 20°F ABOVE 32°F)

ENGINE LIMITS FOR TAKE-OFF 3000 RPM & 52 IN. HG

COMBAT MISSIONS USE 2600 RPM & 38.3 IN. HG

CLIMB DATA

FERRY MISSIONS USE 2280 RPM & 35 IN. HG

GROSS WEIGHT IN LBS.	TYPE OF CLIMB	S. L. TO 5000 FT. ALT.				10,000 FT. ALT.					15,000 FT. ALT.				20,000 FT. ALT				25,000 FT. ALT.				BLOWER CHANGE
		BEST I.A.S. MPH		FT/MIN	TIME FROM S. L.	BEST I.A.S. MPH		FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U. S.	BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U. S	BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U.S	BEST I.A.S MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U.S.	
8500	COMBAT	170		1900	2.5	170		1900	5	13	165	1860	8	17	160	1340	11	23	155	840	16	30	
	FERRY	170		1470	3.5	170		1470	7	12	165	1260	10.5	16	160	730	16	23					
9500	COMBAT	170		1250	4	170		1250	8	17	165	1180	12.5	26	160	680	18	35	155	170	30	47	
	FERRY	170		890	6	170		890	11.5	17	165	680	17	25	160	180	28	41					
10,500	COMBAT	170		940	5	170		940	10	21	165	840	16	31	160	360	24	45					
	FERRY	170		600	7	170		600	15	21	165	400	23	32									

NOTE: INCREASED ELAPSED CLIMBING TIME 5 % FOR EACH 10°C ABOVE 0°C FREE AIR TEMPERATURE (5 % FOR EACH 20°F ABOVE 32°F) FUEL INCLUDES WARM-UP AND TAKE-OFF ALLOWANCE

LANDING DISTANCE (IN FEET)

GROSS WEIGHT IN LBS.	BEST I. A. S. APPROACH MPH		HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY					
			AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.	
			TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL
8000	100		2250	1450	2450	1550	2600	1700	2450	1600	2600	1750	2800	1900	4300	3400	4600	3700	500	4100

NOTE: FOR GROUND TEMPERATURES ABOVE 35°C (95°F) INCREASE APPROACH I.A.S. 10% AND ALLOW 20% INCREASE IN GROUND ROLL.

REMARKS

LEGEND
I.A.S.: Indicated Air Speed
M.P.H.: Miles Per Hour
S.L.: Sea Level
U.S.: U. S. Gallons
IMP.:
NOTE All Distances are Average
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

SPEC. AN-H-6 DEC. 18, 1942 FORM ASC-511

MODEL (S)

P-51A-1, P-51A-2
P-51A-5, P-51A-10

FLIGHT OPERATION INSTRUCTION CHART

SHEET 1 OF 4 SHEETS

GR. WT. 8500 TO 7500 POUNDS

EXTERNAL LOAD ITEMS

WING RACKS

CONDITION	R.P.M.	M.P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	3000	52	—	AUTO RICH	5	157
MILITARY POWER	3000	48.2	—	AUTO RICH	15	135

ENGINE (S) V-1710-81

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS

(NO WIND) (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES STATUTE		FUEL U.S. GALS. (2)	II RANGE IN AIR MILES STATUTE	III RANGE IN AIR MILES STATUTE	IV RANGE IN AIR MILES STATUTE	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES STATUTE
ALT. S. L.	ALT. 12,000						
		180	10 GALLONS NOT AVAILABLE IN FLIGHT			180	
530	550	170	700	870	1050	170	[illegible]
470	490	150	610	770	930	150	[illegible]
410	420	130	530	[illegible]	800	130	[illegible]
340	350	110	450	[illegible]	680	110	[illegible]
280	290	90	370	460	560	90	650
220	230	70	290	360	430	70	[illegible]
160	160	50	200	250	310	50	360
90	100	30	120	150	180	30	220
80	30	10	40	50	60	10	70

OPERATING DATA						(1) DENSITY ALT. IN FEET	OPERATING DATA						OPERATING DATA						OPERATING DATA						(1) DENSITY ALT. IN FEET	OPERATING DATA					
R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH		R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH	R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH	R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH		R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH
						30000																			30000					
						25000																			25000					
2600	290	A.R.	F.T.	103	370	20000	2450	275	A.R.	F.T.	88	360	2300	255	A.R.	F.T.	69	330	2200	245	A.L.	F.T.	52	320	20000	1850	205	A.L.	F.T.	38	270
2600	305	A.R.	38.3	109	365	15000	2350	290	A.R.	34	85	350	2300	270	A.R.	29	69	325	2050	255	A.L.	30	49	305	15000	1650	205	A.L.	F.T.	36	255
2600	310	A.R.	38.3	108	350	12000	2350	290	A.R.	33	81	335	2300	270	A.R.	29	69	315	2050	255	A.L.	31	48	295	12000	1650	205	A.L.	27	34	240
2600	310	A.R.	38.3	106	340	9000	2350	290	A.R.	33	79	320	2280	280	A.L.	33	56	305	1950	255	A.L.	32	46	285	9000	1650	205	A.L.	27	32	230
2600	310	A.R.	38.3	103	330	6000	2350	295	A.R.	34	76	310	2280	285	A.L.	34	56	300	1900	255	A.L.	33	44	275	6000	1650	205	A.L.	27	29	215
2600	315	A.R.	38.3	100	315	3000	2300	295	A.R.	35	72	295	2280	290	A.L.	35	56	290	1850	255	A.L.	33	42	260	3000	1650	205	A.L.	27	28	205
2600	315	A.R.	38.3	96	305	S.L.	2300	295	A.R.	35	70	285	2280	290	A.L.	36	56	280	1700	255	A.L.	34	40	250	S.L.	1650	205	A.L.	27	27	195

LEGEND

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.
(2) ALLOW 10 U. S. GALS. FOR WARM UP.
TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE
RETURN FUEL FLOWS TO TANK
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: AUTO LEAN FOR RPM LESS THAN 2300

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In Hg)
U.S.G.P.H. U.S. Gallons Per Hour
F.T. Full Throttle
S.L. Sea Level
A.R. Auto Rich
A.L. Auto Lean

SPEC. AN-H-8 DEC. 18, 1942 — FORM ASC-511

MODEL (S)

P-51A-1, P-51A-2
P-51A-5, P-51A-10

FLIGHT OPERATION INSTRUCTION CHART

SHEET 2 OF 4 SHEETS

GR. WT. 9500 TO 8000 POUNDS

EXTERNAL LOAD ITEMS

2 - 75-GALLON COMBAT TANKS

CONDITION	R.P.M.	M.P. (IN. HG.)	SUPERCHARGER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	3000	52	—	AUTO RICH	5	157
MILITARY POWER	3000	48.2	—	AUTO RICH	15	135
ENGINE NO.	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS

(NO WIND) (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES STATUTE		FUEL U.S. GALS. (2)	II RANGE IN AIR MILES STATUTE	III RANGE IN AIR MILES STATUTE	IV RANGE IN AIR MILES STATUTE	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES STATUTE
ALT. S.L.	ALT. 12,000	330	10 GALLONS NOT AVAILABLE IN FLIGHT			330	
960	890	320	1150	[illegible]	1600	320	[illegible]
750	780	280	1010	[illegible]	1400	280	[illegible]
650	670	240	860	[illegible]	[illegible]	240	1370
540	560	200	720	[illegible]	[illegible]	200	1140
430	450	160	570	[illegible]	[illegible]	160	910
320	330	120	430	[illegible]	[illegible]	120	690
210	220	80	290	340	400	80	450
110	110	40	140	170	200	40	230

OPERATING DATA						(1) DENSITY ALT. IN FEET	OPERATING DATA						OPERATING DATA						OPERATING DATA						(1) DENSITY ALT. IN FEET	OPERATING DATA					
R.P.M.	I.A.S. M.P.H.	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH		R.P.M.	I.A.S. M.P.H.	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH	R.P.M.	I.A.S. M.P.H.	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH	R.P.M.	I.A.S. M.P.H.	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH		R.P.M.	I.A.S. M.P.H.	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH
						30000																			30000					
						25000																			25000					
2600	245	A.R.	F.T.	103	320	20000	2400	235	A.R.	F.T.	85	305	2300	220	A.R.	F.T.	69	285	2280	215	A.L.	F.T.	57	285	20000	1950	180	A.L.	F.T.	43	240
2600	260	A.R.	38.3	109	315	15000	2350	245	A.R.	34	83	295	2300	230	A.R.	29	69	280	2250	225	A.L.	50	54	275	15000	1800	190	A.L.	F.T.	41	230
2600	260	A.R.	38.3	108	300	12000	2350	245	A.R.	32	79	285	2300	235	A.R.	29	69	270	2250	235	A.L.	51	54	270	12000	1700	190	A.L.	29	40	220
2600	265	A.R.	38.3	106	290	9000	2350	245	A.R.	33	77	270	2280	240	A.L.	32	56	265	2200	235	A.L.	52	53	260	9000	1650	195	A.L.	30	38	215
2600	265	A.R.	38.3	103	280	6000	2300	245	A.R.	34	73	260	2280	240	A.L.	33	56	255	2050	235	A.L.	33	49	245	6000	1650	195	A.L.	30	36	205
2600	265	A.R.	38.3	100	265	3000	2300	250	A.R.	34	70	250	2290	245	A.L.	35	56	245	1950	235	A.L.	34	47	235	3000	1650	195	A.L.	31	35	295
2600	270	A.R.	38.3	96	260	S.L.	2300	255	A.R.	35	69	245	2280	250	A.L.	36	54	240	1900	235	A.L.	36	45	225	S.L.	1650	195	A.L.	31	33	185

Legend

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.
(2) ALLOW 10 U. S. GALS. FOR WARM UP.
TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE
RETURN FUEL FLOWS TO TANK
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: AUTO LEAN FOR RPM LESS THAN 2300.

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In. Hg)
U.S.G.P.H. U.S. Gallons Per Hour
F.T.: Full Throttle
S.L.: Sea Level
A.R.: Auto Rich
A.L.: Auto Lean

SPEC. AN-N-8 DEC. 18, 1942 FORM ASC-511

MODEL (S)

P-51A-1, P-51A-2
P-51A-5, P-51A-10

FLIGHT OPERATION INSTRUCTION CHART

SHEET 3 OF 4 SHEETS

GR. WT. 10,400 TO 8000 POUNDS

EXTERNAL LOAD ITEMS

2 - 150-GALLON FERRY TANKS

CONDITION	R.P.M.	M.P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	3000	52	—	AUTO RICH	5	157
MILITARY POWER	3000	44.2	—	AUTO RICH	15	135
ENGINE IS	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS

(NO WIND) (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES STATUTE ALT. S.L.	I (MAX. CONT. POWER) RANGE IN AIR MILES STATUTE ALT. 12,000	FUEL U.S. GALS. (2)	II RANGE IN AIR MILES STATUTE	III RANGE IN AIR MILES STATUTE	IV RANGE IN AIR MILES STATUTE	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES STATUTE
		480	15 GALLONS NOT AVAILABLE IN FLIGHT			480	
1310	1790	465	1670	2060	2400	465	2710
1130	1590	400	1440	1770	2060	400	2350
930	1050	350	1260	1560	1800	350	2060
850	900	300	1080	1330	1550	300	1760
710	750	250	900	1110	1290	250	1470
570	600	200	720	890	1030	200	70
420	450	150	540	670	770	150	940
280	300	100	360	440	510	100	590
140	150	50	180	220	260	50	290

OPERATING DATA R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN. Hg	U.S. G.P.H.	T.A.S. MPH	(1) DENSITY ALT. IN FEET	OPERATING DATA R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN. Hg	U.S. G.P.H.	T.A.S. MPH	OPERATING DATA R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN. Hg	U.S. G.P.H.	T.A.S. MPH	OPERATING DATA R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN. Hg	U.S. G.P.H.	T.A.S. MPH	(1) DENSITY ALT. IN FEET	OPERATING DATA R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN. Hg	U.S. G.P.H.	T.A.S. MPH
						30000																			30000					
						25000																			25000					
2600	270	A.R.	F.T.	103	340	20000	2550	265	A.R.	F.T.	97	335	2400	250	A.R.	30	74	320	2280	240	A.L.	29	67	310	20000	2250	210	A.L.	F.T.	46	270
2600	285	A.R.	38.4	109	335	15000	2400	275	A.R.	35	91	325	2300	255	A.R.	30	72	300	2280	250	A.L.	30	66	295	15000	1900	210	A.L.	F.T.	45	260
2600	290	A.R.	38.4	108	325	12000	2350	275	A.R.	34	86	310	2300	255	A.R.	30	70	290	2280	255	A.L.	31	66	285	12000	1750	210	A.L.	30	41	240
2600	290	A.R.	38.4	106	310	9000	2350	275	A.R.	34	83	295	2300	260	A.R.	31	69	280	2200	255	A.L.	30	64	275	9000	1650	210	A.L.	30	39	230
2600	290	A.R.	38.4	103	295	6000	2350	275	A.R.	35	77	280	2280	265	A.L.	34	66	270	2100	255	A.L.	33	59	260	6000	1650	210	A.L.	30	37	210
2600	290	A.R.	38.4	100	285	3000	2350	275	A.R.	35	75	270	2280	270	A.L.	35	66	265	2050	255	A.L.	34	49	250	3000	1650	210	A.L.	31	35	205
2600	290	A.R.	38.4	96	275	S.L.	2350	275	A.R.	35	71	250	2280	270	A.L.	36	65	255	1950	255	A.L.	35	47	240	S.L.	1650	210	A.L.	31	34	195

LEGEND

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.

(2) ALLOW 15 U. S. GALS. FOR WARM UP,
TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE
RETURN FUEL FLOWS TO TANK
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: AUTO LEAN FOR RPM LESS THAN 2300.

I A S Indicated Air Speed
M P Manifold Pressure (In Hg)
F.T.: Full Throttle
S.L.: Sea Level
A.R.: Auto Rich
A.L.: Auto Lean

SPEC. AN-4-B DEC. 16, 1942 — FORM ASC-511

MODEL (S)

P-51A-1, P-51A-2
P-51A-5, P-51A-10

FLIGHT OPERATION INSTRUCTION CHART

SHEET 4 OF 4 SHEETS

GR. WT. 9500 TO 8000 POUNDS

EXTERNAL LOAD ITEMS

2 WING BOMBS

CONDITION	R.P.M.	M.P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	3000	52	—	AUTO RICH	5	157
MILITARY POWER	3000	48.2	—	AUTO RICH	15	135
ENGINE (S)	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS

(NO WIND) — (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES STATUTE		FUEL U.S. GALS. ②	II RANGE IN AIR MILES STATUTE	III RANGE IN AIR MILES STATUTE	IV RANGE IN AIR MILES STATUTE	FUEL U.S. GALS. ②	V (MAX. RANGE) RANGE IN AIR MILES STATUTE
ALT. S.L.	ALT. 12,000	180	10 GALLONS NOT AVAILABLE IN FLIGHT			180	
480	500	170	650	[illegible]	[illegible]	170	[illegible]
420	440	150	570	[illegible]	[illegible]	150	[illegible]
370	390	130	490	[illegible]	[illegible]	130	[illegible]
310	320	110	420	[illegible]	[illegible]	110	[illegible]
250	260	90	340	[illegible]	[illegible]	90	[illegible]
190	200	70	270	[illegible]	[illegible]	70	440
140	140	50	190	[illegible]	[illegible]	50	310
80	80	30	110	140	160	30	190
30	30	10	40	40	50	10	60

OPERATING DATA

R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH	① DENSITY ALT. IN FEET
						30000
						25000
2600	255	A.R.	F.T.	103	335	20000
2600	270	A.R.	38.3	109	325	15000
2600	275	A.R.	38.3	108	320	12000
2600	280	A.R.	38.3	106	310	9000
2600	280	A.R.	38.3	103	295	6000
2600	280	A.R.	38.3	100	280	3000
2600	285	A.R.	38.3	96	275	S.L.

OPERATING DATA

R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN. Hg	U.S. G.P.H.	T.A.S. MPH
2400	245	A.R.	F.T.	82	315
2350	255	A.R.	33	81	305
2300	255	A.R.	32	77	295
2300	255	A.R.	32	74	280
2300	255	A.R.	33	71	270
2300	260	A.R.	34	69	260
2300	260	A.R.	35	68	250

OPERATING DATA

R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH
2300	230	A.R.	F.T.	68	300
2300	240	A.R.	29	69	290
2300	245	A.R.	29	69	285
2280	245	A.L.	32	54	275
2280	250	A.L.	34	56	265
2260	255	A.L.	35	56	255
2250	260	A.L.	36	55	250

OPERATING DATA

R.P.M.	I.A.S. M.P.H.	MIX TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH
2200	220	A.L.	F.T.	52	290
2150	230	A.L.	30	51	280
2150	235	A.L.	31	50	270
2050	235	A.L.	32	49	260
1900	235	A.L.	33	45	250
1810	235	A.L.	33	43	235
1750	235	A.L.	34	41	225

OPERATING DATA

R.P.M.	I.A.S. M.P.H.	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. MPH	① DENSITY ALT. IN FEET
						30000
						25000
1900	185	A.L.	F.T.	39	245	20000
[illegible]	195	A.L.	F.T.	38	240	15000
165	195	A.L.	28	36	225	12000
165	195	A.L.	28	34	215	9000
1650	195	A.L.	29	33	205	6000
1650	195	A.L.	29	32	195	3000
1650	195	A.L.	29	30	185	S.L.

LEGEND

① INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.
② ALLOW 10 U. S. GALS. FOR WARM UP.
TAKE-OFF AND CLIMB TO 3000 FEET ALTITUDE
RETURN FUEL FLOWS TO TANK
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: AUTO LEAN FOR RPM LESS THAN 2300.

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In Hg)
U.S.G.P.H. U.S. Gallons Per Hour
F.T.: Full Throttle
S.L.: Sea Level
A.R.: Auto Rich
A.L.: Auto Lean

SPEC. AN-H-8 DEC. 18, 1942 — FORM ASC-511

MODEL (S)	FOR NAVY USE ONLY **FLIGHT OPERATION INSTRUCTION CHART**	EXTERNAL LOAD ITEMS
P-51A-1, P-51A-2 P-51A-5, P-51A-10	SHEET 1 OF 4 SHEETS GR. WT. 8500 TO 7500 POUNDS	WING RACKS

CONDITION	R.P.M.	M.P. (IN HG)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN	US GPH
TAKE-OFF	3000	52	—	AUTO RICH	5	15[illegible]
MILITARY POWER	3000	[illegible]	—	AUTO RICH	15	135
ENGINE (S)	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS

(NO WIND) — (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES NAUTICAL — ALT. S.L.	I — ALT. 12.000	FUEL U.S. GALS. (2)	II RANGE IN AIR MILES NAUTICAL	III RANGE IN AIR MILES NAUTICAL	IV RANGE IN AIR MILES NAUTICAL	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES NAUTICAL
		180	10 GALLONS NOT AVAILABLE IN FLIGHT			180	
[illegible]	[illegible]	170	600	[illegible]	[illegible]	170	[illegible]
4[illegible]	[illegible]	150	530	[illegible]	[illegible]	150	[illegible]
[illegible]	[illegible]	130	[illegible]	[illegible]	[illegible]	130	[illegible]
[illegible]	[illegible]	110	[illegible]	[illegible]	600	110	[illegible]
240	250	90	320		480	90	[illegible]
190	200	70	250		370	70	[illegible]
130	140	50	170		270	50	720
[illegible]	60	30	[illegible]	130	160	30	190
[illegible]	30	10	[illegible]	40	80	10	60

OPERATING DATA

(1) DENSITY ALT. IN FEET	I R.P.M.	I I.A.S. KNOTS	I MIX-TURE	I M.P. IN Hg	I U.S. G.P.H.	I T.A.S. KNOTS	II R.P.M.	II I.A.S. KNOTS	II MIX-TURE	II M.P. IN Hg	II U.S. G.P.H.	II T.A.S. KNOTS	III R.P.M.	III I.A.S. KNOTS	III MIX-TURE	III M.P. IN Hg	III U.S. G.P.H.	III T.A.S. KNOTS
30000																		
25000																		
20000	2600	250	A.R.	F.T.	103	325	2450	240	A.R.	F.T.	88	310	2300	220	A.R.	F.T.	69	285
15000	2600	265	A.R.	38.3	109	315	2350	250	A.R.	34	85	300	2300	235	A.R.	29	69	280
12000	2600	265	A.R.	38.3	108	305	2350	250	A.R.	33	81	290	2300	235	A.R.	29	69	270
9000	2600	270	A.R.	38.3	106	295	2350	250	A.R.	33	79	275	2280	240	A.L.	[illegible]	[illegible]	265
6000	2600	270	A.R.	38.3	103	285	2350	255	A.R.	34	76	270	2280	245	A.L.	34	56	260
3000	2600	275	A.R.	38.3	100	275	2300	255	A.R.	35	72	255	2280	[illegible]	A.L.	[illegible]	56	250
S.L.	2600	275	A.R.	38.3	96	265	2300	255	A.R.	35	70	245	2280	255	A.L.	36	56	215

(1) DENSITY ALT. IN FEET	IV R.P.M.	IV I.A.S. KNOTS	IV MIX-TURE	IV M.P. IN Hg	IV U.S. G.P.H.	IV T.A.S. KNOTS	V R.P.M.	V I.A.S. KNOTS	V MIX-TURE	V M.P. IN Hg	V U.S. G.P.H.	V T.A.S. KNOTS
30000												
25000												
20000	[illegible]	215	A.L.	F.T.	52	280	1850	180	A.L.	F.T.	39	235
15000	[illegible]	220	A.L.	30	49	265	1650	180	A.L.	F.T.	36	220
12000	[illegible]	225	A.L.	31	48	260	1650	180	A.L.	27	34	210
9000	1650	225	A.L.	32	46	250	1650	180	A.L.	27	32	200
6000	[illegible]	225	A.L.	33	44	240	1650	180	A.L.	27	29	190
3000	[illegible]	225	A.L.	33	42	225	1650	180	A.L.	27	28	180
S.L.	1700	225	A.L.	34	41	215	1650	180	A.L.	27	27	170

LEGEND

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.
(2) ALLOW 10 U.S. GALS. FOR WARM UP.
TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE
RETURN FUEL FLOWS TO TANK
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: AUTO LEAN FOR RPM LESS THAN 2300.

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In Hg)
U.S.G.P.H. U.S. Gallons Per Hour
F.T. Full Throttle
S.L. Sea Level
A.R. Auto Rich
A.L. Auto Lean

T. O. No. 01-60JC-1

Revised October 25, 1943

SPEC. AN-H-8 DEC. 18, 1942 — FORM ASC-511

MODEL (S)

P-51A-1, P-51A-2

P-51A-5, P-51A-10

FOR NAVY USE ONLY

FLIGHT OPERATION INSTRUCTION CHART

SHEET 2 OF 4 SHEETS

GR. WT. 9500 TO 8000 POUNDS

EXTERNAL LOAD ITEMS

2 - 75-GALLON COMBAT TANKS

CONDITION	R.P.M.	M.P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN	U.S. G.P.H.
TAKE-OFF	3000	52	—	AUTO RICH	5	155
MILITARY POWER	3000	44.2	—	AUTO RICH	15	135
ENGINE (S)	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

(NO WIND)

ALTERNATE CRUISING CONDITIONS

(NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES NAUTICAL ALT. S.L.	I (MAX. CONT. POWER) RANGE IN AIR MILES NAUTICAL ALT. 12,000	FUEL U.S. GALS. (2)	II RANGE IN AIR MILES NAUTICAL	III RANGE IN AIR MILES NAUTICAL	IV RANGE IN AIR MILES NAUTICAL	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES NAUTICAL
		330	10 GALLONS NOT AVAILABLE IN FLIGHT			330	
750	780	320	1000	[illegible]	[illegible]	320	[illegible]
690	690	280	[illegible]	[illegible]	[illegible]	280	[illegible]
620	630	240	790	[illegible]	[illegible]	240	[illegible]
470	510	200	[illegible]	[illegible]	[illegible]	200	[illegible]
370	390	160	540	[illegible]	[illegible]	160	[illegible]
280	290	120	370	[illegible]	[illegible]	120	[illegible]
190	190	80	250	[illegible]	[illegible]	80	[illegible]
90	90	40	120	[illegible]	[illegible]	40	[illegible]

OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	(1) DENSITY ALT. IN FEET	OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	(1) DENSITY ALT. IN FEET	OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS
						30000																			30000					
						25000																			25000					
2600	215	A.R.	F.T.	103	275	20000	2400	205	A.R.	F.T.	85	265	2300	190	A.R.	F.T.	69	245	2280	185	A.L.	F.T.	67	240	20000	1950	165	A.L.	F.T.	47	205
2600	225	A.R.	38.3	109	270	15000	2350	210	A.R.	34	83	255	2300	200	A.R.	29	69	240	2250	195	A.L.	30	64	235	15000	1950	165	A.L.	F.T.	41	200
2600	225	A.R.	38.3	108	260	12000	2350	215	A.R.	32	79	245	2300	200	A.R.	29	64	235	2250	195	A.L.	31	64	230	12000	1750	165	A.L.	39	40	195
2600	230	A.R.	38.3	106	250	9000	2350	215	A.R.	33	77	235	2280	195	A.L.	32	66	230	2200	200	A.L.	32	58	225	9000	1650	170	A.L.	30	36	185
2600	230	A.R.	38.3	103	240	6000	2300	215	A.R.	34	73	225	2280	210	A.L.	33	58	220	2150	200	A.L.	33	49	215	6000	1650	170	A.L.	30	36	180
2600	235	A.R.	38.3	100	235	3000	2300	215	A.R.	34	70	215	2280	215	A.L.	35	56	215	1950	200	A.L.	34	47	200	3000	1650	170	A.L.	31	35	170
2600	235	A.R.	38.3	96	225	S.L.	2300	220	A.R.	35	69	210	2280	215	A.L.	36	56	205	1900	205	A.L.	35	45	190	S.L.	1650	170	A.L.	31	33	160

LEGEND

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.

(2) ALLOW 10 U. S. GALS. FOR WARM UP

TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE

RETURN FUEL FLOWS TO TANK

USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: AUTO LEAN FOR RPM LESS THAN 2300.

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In Hg)
U.S.G.P.H. U. S. Gallons Per Hour
F.T. Full Throttle
S.L. Sea Level
A.R. Auto Rich
A.L. Auto Lean

SPEC. AN-H-8 DEC. 16, 1942 — FORM ASC-511

MODEL (S)
P-51A-1, P-51A-2
P-51A-5, P-51A-10

FOR NAVY USE ONLY

FLIGHT OPERATION INSTRUCTION CHART

SHEET 3 OF 4 SHEETS

GR. WT. 10,400 TO 8000 POUNDS

EXTERNAL LOAD ITEMS
2 - 150-GALLON FERRY TANKS

CONDITION	R.P.M.	M.P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	3000	52	—	AUTO RICH	5	157
MILITARY POWER	3000	44.2	—	AUTO RICH	15	135
ENGINE (S)	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. *NOTES:* (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS

(NO WIND) (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES NAUTICAL ALT. S.L.	I (MAX. CONT. POWER) RANGE IN AIR MILES NAUTICAL ALT. 12,000	FUEL U.S. GALS. (2)	II RANGE IN AIR MILES NAUTICAL	III RANGE IN AIR MILES NAUTICAL	IV RANGE IN AIR MILES NAUTICAL	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES NAUTICAL
		480	*15 GALLONS NOT AVAILABLE IN FLIGHT*			480	
1190	1200	465	1450	1790	2080	465	2380
990	1040	400	1210	1540	1730	400	2040
860	910	350	1090	1350	1560	350	1790
740	790	300	940	1150	1340	300	1530
610	650	250	780	960	1120	250	1270
490	520	200	620	770	890	200	1020
370	390	150	470	580	670	150	760
240	260	100	310	380	450	100	510
120	130	50	150	190	220	50	250

OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	(1) DENSITY ALT. IN FEET
						30000
						25000
2600	235	A.R.	F.T.	103	295	20000
2600	250	A.R.	38.4	109	290	15000
2600	250	A.R.	38.4	108	280	12000
2600	250	A.R.	38.4	106	270	9000
2600	250	A.R.	38.4	103	255	6000
2600	250	A.R.	38.4	100	245	3000
2600	250	A.R.	38.4	96	235	S.L.

OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS
2550	230	A.R.	F.T.	97	290
2400	240	A.R.	35	91	280
2350	240	A.R.	34	86	270
2350	240	A.R.	34	83	260
2350	240	A.R.	35	77	245
2350	240	A.R.	35	75	235
2350	240	A.R.	35	71	225

OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS
2400	220	A.R.	30	74	280
2300	220	A.R.	30	72	260
2300	225	A.R.	30	70	250
2300	225	A.R.	31	69	245
2280	230	A.L.	34	66	235
2280	230	A.L.	35	66	225
2280	235	A.L.	36	66	220

OPERATING DATA R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS
2280	210	A.L.	29	57	270
2280	215	A.L.	30	56	255
2280	220	A.L.	31	56	245
2280	220	A.L.	32	54	240
2100	220	A.L.	33	50	225
2050	220	A.L.	34	49	215
1950	220	A.L.	35	47	205

OPERATING DATA (1) DENSITY ALT. IN FEET	R.P.M.	I.A.S. KNOTS	MIXTURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS
30000						
25000						
20000	2050	190	A.L.	F.T.	46	235
15000	1900	190	A.L.	F.T.	45	220
12000	1750	190	A.L.	40	41	210
9000	1650	190	A.L.	30	39	200
6000	1650	190	A.L.	30	37	190
3000	1650	190	A.L.	31	35	180
S.L.	1650	190	A.L.	31	34	170

LEGEND

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.

(2) ALLOW 15 U. S. GALS. FOR WARM UP.

TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE

RETURN FUEL FLOWS TO TANK

USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: *AERO LEAN FOR RPM LESS THAN 2300.*

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In Hg)
U.S.G.P.H. U.S. Gallons Per Hour
F.T. Full Throttle
S.L. Sea Level
A.R. Auto Rich
A.L. Auto Lean

SPEC. AN-H-8 DEC. 18, 1942 — FORM ASC-511

MODEL (S)
P-51A-1, P-51A-2
P-51A-5, P-51A-10

FOR NAVY USE ONLY

FLIGHT OPERATION INSTRUCTION CHART

SHEET 4 OF 4 SHEETS

GR. WT. 9500 TO 8000 POUNDS

EXTERNAL LOAD ITEMS
2 WING BOMBS

CONDITION	R.P.M.	M.P. (IN HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	3000	52	—	A.T.C. RICH	5	165
MILITARY POWER	3000	48.2	—	A.T.C. RICH	15	135
ENGINE (S)	V-1710-81					

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. **NOTES:** (A) Avoid continuous cruising in Column I except in emergency. (B) Columns (II, III, IV & V) toward the right progressively give increase in range at sacrifice in speed. (C) Manifold Pressure (M.P.), Gallons Per Hour (G.P.H.), are approximate maximum values for reference. (D) For quick reference, take-off and military power data are listed in the upper left corner of chart.

(NO WIND) **ALTERNATE CRUISING CONDITIONS** (NO RESERVE FUEL ALLOWANCE)

I (MAX. CONT. POWER) RANGE IN AIR MILES NAUTICAL		FUEL U.S. GALS. (2)	II RANGE IN AIR MILES NAUTICAL	III RANGE IN AIR MILES NAUTICAL	IV RANGE IN AIR MILES NAUTICAL	FUEL U.S. GALS. (2)	V (MAX. RANGE) RANGE IN AIR MILES NAUTICAL
ALT. S.L.	ALT. 12,000						
		180	10 GALLONS NOT AVAILABLE IN FLIGHT			180	
420	430	170	500	[illegible]	600	170	[illegible]
370	380	150	500	[illegible]	710	150	[illegible]
		130				130	
320	330	110	430	[illegible]	610	110	[illegible]
270	280	90	360	[illegible]	[illegible]	90	
		70				70	
220	230	50	300	[illegible]	420	50	[illegible]
170	180	30	230	[illegible]	330	30	[illegible]
120	130	10	160	[illegible]	230	10	[illegible]
		5				5	
70	70	0	100	120	140	0	150
20	20		30	40	40		[illegible]

OPERATING DATA						(1) DENSITY ALT. IN FEET	OPERATING DATA						OPERATING DATA						OPERATING DATA						(1) DENSITY ALT. IN FEET	OPERATING DATA					
R.P.M.	I.A.S. KNOTS	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS		R.P.M.	I.A.S. KNOTS	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	R.P.M.	I.A.S. KNOTS	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS	R.P.M.	I.A.S. KNOTS	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS		R.P.M.	I.A.S. KNOTS	MIX-TURE	M.P. IN Hg	U.S. G.P.H.	T.A.S. KNOTS
						30000																			30000					
						25000																			25000					
2600	220	A.R.	F.T.	103	290	20000	2400	210	A.R.	F.T.	82	275	2300	200	A.R.	F.T.	68	260	2200	195	A.L.	F.T.	58	245	20000	1900	160	A.L.	F.T.	39	210
2600	235	A.R.	38.3	109	285	15000	2350	220	A.R.	33	81	265	2300	205	A.R.	29	69	250	2150	200	A.L.	30	51	240	15000	1700	170	A.L.	F.T.	38	205
2600	240	A.R.	38.3	108	275	12000	2300	220	A.R.	32	77	255	2300	210	A.R.	29	69	245	2150	205	A.L.	31	50	240	12000	1650	170	A.L.	28	36	195
2600	240	A.R.	38.3	106	265	9000	2300	220	A.R.	32	74	245	2280	215	A.L.	32	64	235	2050	205	A.L.	32	48	225	9000	1650	170	A.L.	28	34	185
2600	245	A.R.	38.3	103	255	6000	2300	220	A.R.	33	71	235	2280	215	A.L.	34	66	230	1900	205	A.L.	33	45	215	6000	1650	170	A.L.	29	33	180
2600	245	A.R.	38.3	100	245	3000	2300	225	A.R.	34	69	225	2280	220	A.L.	35	56	220	1800	205	A.L.	33	43	205	3000	1650	170	A.L.	29	32	170
2600	245	A.R.	38.3	96	235	S.L.	2300	230	A.R.	35	68	220	2250	225	A.L.	36	55	215	1750	205	A.L.	34	41	195	S.L.	1650	170	A.L.	29	30	160

LEGEND

(1) INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.

(2) ALLOW 10 U. S. GALS. FOR WARM UP.
TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE
RETURN FUEL FLOWS TO TANK
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

Note: *AUTO LEAN FOR RPM LESS THAN 2300.*

I.A.S. Indicated Air Speed
M.P. Manifold Pressure (In Hg)
U.S.G.P.H. U.S. Gallons Per Hour
F.T.: Full Throttle
S.L.: Sea Level
A.R.: Auto Rich
A.L.: Auto Lean

37 (1) (2)

station. The set is turned off by pushing the button marked "OFF."

(4) REMOTE CONTACTOR. — The contactor is located in the left-hand side of the instrument panel. The contactor, consisting of a switch operated by a clock, serves to switch the transmitter from any of the four voice-modulated bands to the D band, tone modulated for 14 seconds of every minute. The pointer on the face of the contactor indicates when the switching action will take place. This will warn the pilot that speech will NOT be transmitted until the special transmission period is over, at which time the contactor will automatically switch the transmitter back to the band that was being used before and voice transmission may be resumed. In case an urgent message is to be transmitted without interruption, the switch marked "CONTACTOR" on the face of the contactor may be switched to the "OFF" position. The clock switch should never be touched in flight since it is normally set on the ground by the service crew.

c. COMMAND SET SCR-274-N.

(1) DESCRIPTION. — The transmitters of radio set SCR-274-N broadcast throughout the frequency range of 4 to 5.2 megacycles and 7 to 9.1 megacycles; the range of the three receivers is from 3.0 to 9.1 megacycles and 190 to 550 kilocycles. No spare coils are required for either transmitters or receivers.

(2) RECEPTION.—Before starting the engine, proceed as follows: Turn the receiver switch to the "MCW" (modulated continuous wave) position to test reception before the airplane engine is started. See that the frequency range on the dials can be swept through for the chosen position of the tuning unit pointer without encountering the stops on the unit. Plug the headphones into the jack under the receiver control switches. When the tubes are warm, a slight hum should be heard in the headphones to indicate that the receiver is operating. Turn the volume control to the full "INCREASE" position. When the engine is not operating, atmospheric and electrical disturbances are usually heard only at the maximum position of the volume control. Tune in signals by rotating the tuning cranks of the control unit. As the receiver is tuned, adjust the volume control for suitable signal intensity. After the engine has been started, repeat the procedure already outlined and note the noise level and electrical disturbances. If, with the volume control set at maximum in any position of the tuning dial the electrical noise in the headphones is increased, imperfect shielding of the ignition or generator system or difficulty with the voltage regulator of the charging generator is indicated. Under these conditions, only those radio signals can be satisfactorily received which are of greater intensity than the local disturbances.

(3) TRANSMISSION. — With the receiver switch turned to "MCW" and the transmitter switch turned to "VOICE," plug a microphone into the jack provided under the transmitter switch, and proceed as follows:

(a) Press the switch on the microphone. A click should be heard in the headphones.

(b) Talk into the microphone. Voice sidetone should be heard in the headphones.

(c) Push the transmitter switch to "TONE" and press the microphone switch or the key. A steady tone should be heard in the headphones.

(d) Push the transmitter switch to "CW" and press the microphone switch or the key. A steady tone should be heard in the headphones.

d. RADIO SET SCR-535 (IFF).

(1) The Control box for this equipment is located on the right side of the cockpit adjacent to the pilot's seat. Operation of this equipment is automatic, and the pilot has only to place the "ON-OFF" switch, located on the face of the control unit, in its "ON" position to place the equipment in operation.

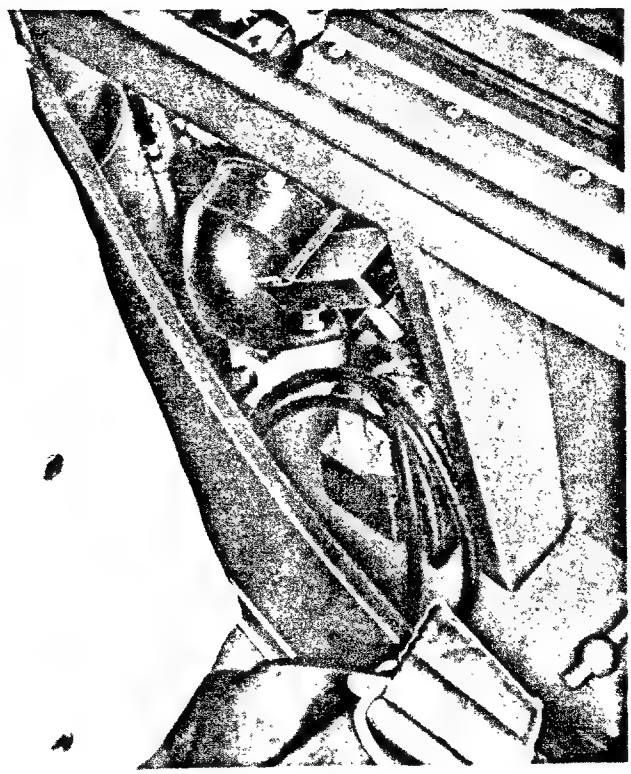


Figure 19—Interaircraft Signal Lamp

(2) A dual push-button switch marked "DANGER" is located on the right side of the cockpit aft of the receiver control box. The purpose of this switch is to destroy the IFF equipment should it be necessary to abandon the airplane over unfriendly territory. When both push buttons are pressed, a detonator is set off in the receiver which will destroy the receiver internally. No damage to the airplane will result at the time of destruction of the IFF set.

NOTE

Regeneration adjustment of the IFF set must be made on the ground prior to flight to ensure correct operation of the equipment.

e. INTERAIRCRAFT SIGNAL LAMP.—Provisions have been made for the stowage of a type AN-3089 quick signalling lamp for signalling from one airplane to another without using the radio equipment. A sight on top of the lamp permits more accurate control of the direction of the signal beam. Four snap-on filters are provided to control the color of the light beam. The filters are usually stowed in the map case.

2. GUNNERY EQUIPMENT.

a. GUNS.—The airplane is equipped with four fixed .50-caliber machine guns, two in the leading edge of each wing. The maximum ammunition allotment is 280 rounds for the rear ammunition compartments and 350 rounds for the front compartments. The guns are adjusted horizontally and vertically so that the fire converges with the line of sight at 300 yards. The guns are manually charged prior to flight. All guns fire simultaneously. To fire the guns, lift the gun and camera safety switch, located on the armament control panel, to "GUNS AND CAMERA" and depress the trigger switch on the control stick grip. The gun heaters, one in each gun compartment, operate when the heater switch, located on the armament control panel, is lifted to "ON." The switch should never be on during take-off or landing, and should be turned to "OFF" when firing the guns.

b. GUN SIGHTS.—An optical gun sight and auxiliary ring-and-bead sight are provided. The sights are adjusted so that the line of sight is parallel to the center line of the airplane and to the flight path of the airplane at 87 percent of maximum indicated air speed in level flight. To operate the optical gun sight lamp and to regulate the light intensity of the reticle image on the gun sight reflector, turn the gun sight rheostat, located on the right side of the pilot's switch panel, to "ON." The initial movement of the rheostat turns on the lamp and further rotation of the rheostat toward "ON" increases the light intensity. The sunscreen forward of the reflector may be swung in front of the reflector to reduce sun glare. In the event of malfunctioning of the optical gun sight, the auxiliary gun sight may be used. The bead sight may be installed on the fire wall forward of the cockpit. It is necessary to remove the ring sight from the stowage clips under the right side of the instrument panel glare shield, and install it in the mounting socket located on the windshield frame to the right of the rearview mirror. This is done by pulling out the spring-loaded plunger of the socket, inserting the stem of the ring sight into the socket, then releasing the plunger so that it engages with the stem and holds the sight in position.

c. GUN CAMERA.—Provisions for a type N-1 or AN-N4 gun camera are located in the leading edge of the left wing inboard of the gun bay. The camera is adjusted to converge with the line of sight of the gun sight at 300 yards. To operate the camera simultaneously with the guns, lift the gun and camera safety switch on the lower left side of the instrument panel to the "GUNS AND CAMERA" position, and depress the trigger switch on the control stick grip. To operate the camera without firing the guns, place the gun and camera safety switch in the "CAMERA" position and depress the trigger switch. When through photographing, place the gun and camera safety switch in the "OFF" position.

NOTE

Should the temperature drop, the heaters in the camera body will function automatically. Therefore, it is always necessary to have the safety switch in the "OFF" position when the camera is not in use.

3. BOMBING EQUIPMENT.

Each wing is equipped with an external bomb rack designed to carry one 100-pound, one 250-pound, one 300-pound, or one 500-pound bomb. The bombs are released simultaneously, either manually or electrically, in the safe or armed condition. The bomb control handle, located on the forward left side of the cockpit, is provided with three positions: aft "LOCK" (locked), center "SEL" (selective), and forward "SALVO." To disengage the bomb control handle from either the locked or selective position, it is necessary to push down on the button on the top of the control handle. An antisalvo guard is provided to prevent accidental release of the bombs.

a. INOPERATIVE POSITION OF CONTROLS.—When not in use, the controls shall be positioned as follows:

(1) Bomb control handle in "LOCK" with antisalvo guard down.

(2) Bomb safety switch "OFF."

(3) Nose and tail arming switches "OFF."

(4) Bomb support hooks closed when bombs are not to be carried.

b. RELEASE OF BOMBS.

The NORMAL release of bombs shall be accomplished as follows:

(a) Move the bomb control handle to "SELECTIVE."

(b) Position the nose and tail arming switches as desired.

(c) Turn the bomb safety switch "ON."

(d) Press bomb release switch.

(e) Move controls to inoperative position.

(2) The ALTERNATE release of bombs should be used when the NORMAL release has failed to drop bombs. This release shall be accomplished as follows:

(a) Position nose and tail arming switches as desired.

(b) Hinge the antisalvo guard upward and move the bomb control handle to the extreme forward or "SALVO" position.

1. For the EMERGENCY release of bombs, or if it is desired to release bombs in a safe condition, as in the case of a landing, the electrical control must be "OFF"; then hinge the antisalvo guard upward and move the bomb control handle to the extreme forward or "SALVO" position.

2. The optical gun sight may be used as an auxiliary bomb sight. The bombs may be released when the airplane is in any attitude of flight from a 30-degree climb to a vertical dive.

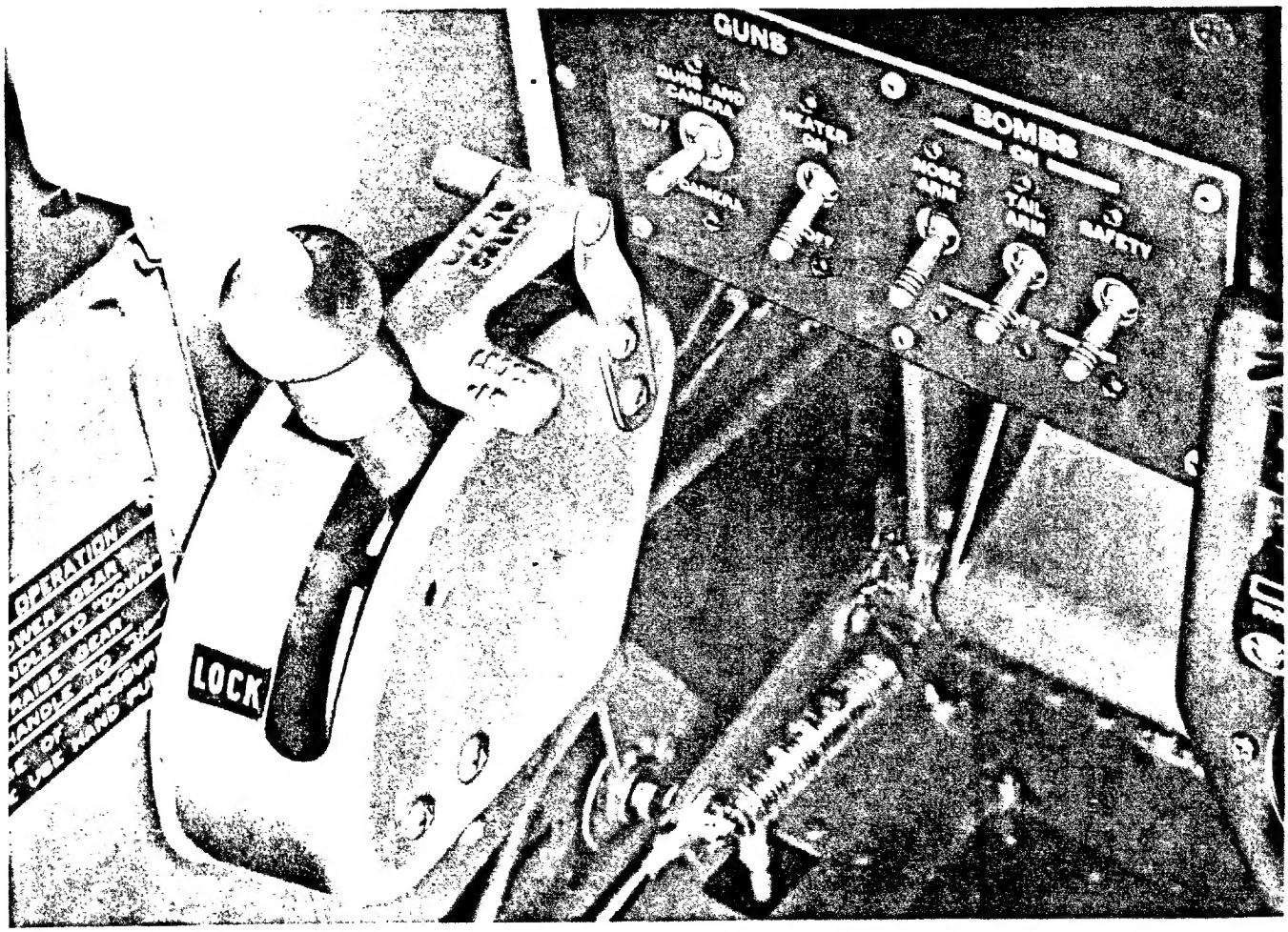


Figure 20—Bomb Controls

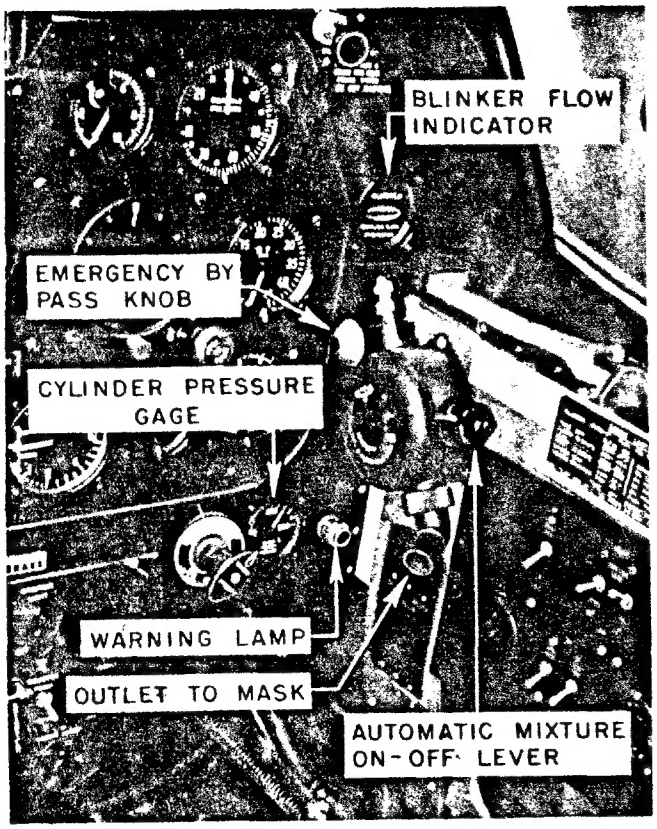


Figure 21—Oxygen Equipment

CAUTION

To prevent either bomb from falling into the propeller, do not release the bombs when sideslipping more than 5 degrees in a vertical dive. DO NOT land with large bombs installed. The landing gear was not designed to handle the extra weight. Obviously, careful landings on concrete runways with heavy overloads may be made successfully. But the penalties of faulty judgment or technique should be carefully considered.

4. OXYGEN EQUIPMENT.

a. DESCRIPTION.—The oxygen system consists of two type D-2 low-pressure oxygen cylinders mounted in the fuselage aft of the radio compartment, a type A-12 demand regulator, a cylinder pressure gage, low-pressure warning signal, and a flow indicator. Masks types A-9, A-9A, or A-10 may be used.

DANGER

If oxygen comes in contact with oil or any material containing oil, spontaneous combustion and explosion are certain to occur. Every precaution must be observed to keep oil, grease, and all

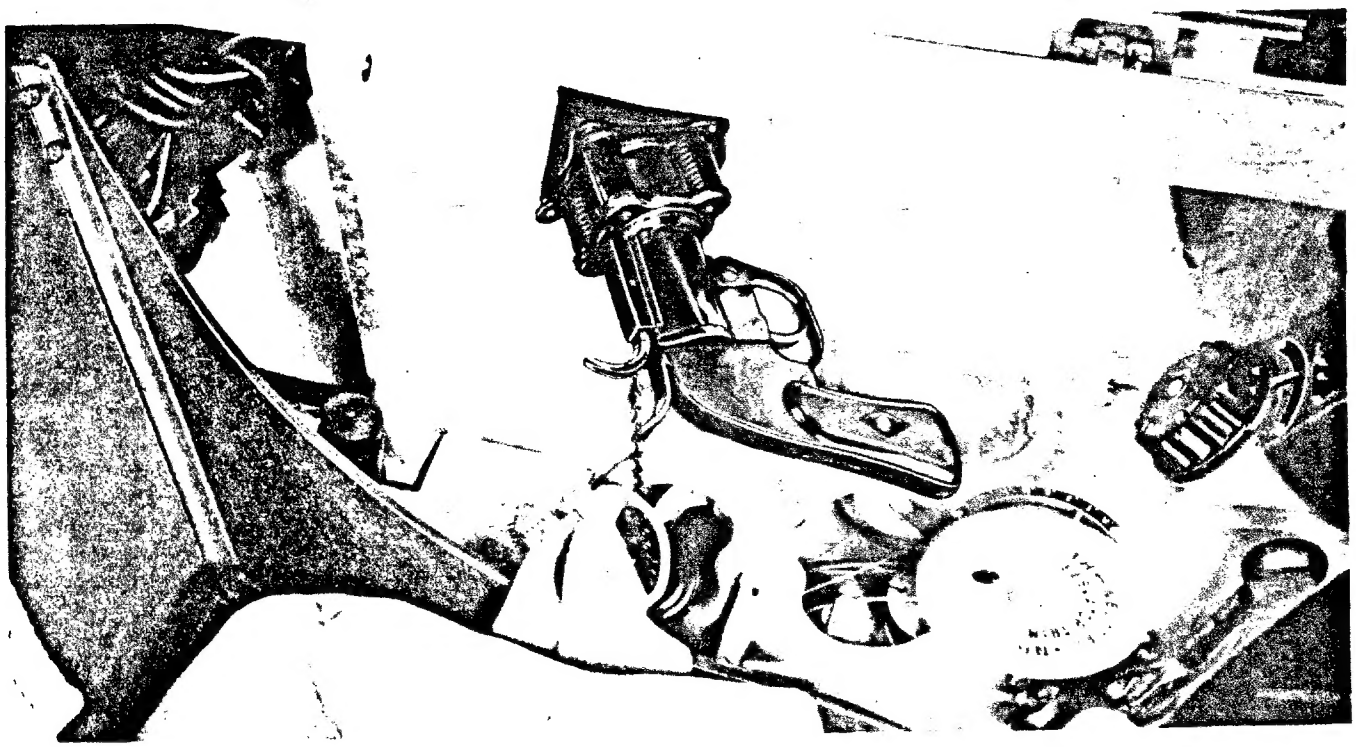


Figure 22—Pyrotechnic Pistol Mounted For Firing

readily combustible materials well away from all oxygen apparatus.

b. USE.—The A-12 demand-type regulator, mounted in the forward right-hand corner of the pilot's cockpit, normally requires no adjustment; the mixing of air and oxygen and the compensation for change in altitude is fully automatic. Should the pilot desire pure oxygen, the automatic mixture lever at the side of the case should be turned to the "OFF" position and no air will enter the regulator mixing chamber. The red emergency knob on the front of the regulator is turned on only in the event of failure of the regulator mechanism. With the emergency knob "ON," oxygen is then supplied at a normal fixed rate of flow. With the automatic mixture lever set in the "ON" position, the mask may be worn and connected at any altitude. Only air will flow until oxygen becomes necessary.

c. INDICATORS.—A blinker indicator on the instrument panel operates while the mask is being used which indicates proper functioning of the system. When the pressure of the cylinders drops to the danger point (100 pounds per square inch), a signal lamp on the instrument panel is illuminated. The normal full pressure of the system is 365 pounds per square inch. Make certain that the cylinder pressure gage on the instrument panel shows sufficient oxygen supply for the mission before take-off.

PRECAUTION

The construction of the type A-9, A-9A, and A-10 oxygen masks is of such nature that they will not stand abuse; consequently, it is imperative that masks be properly stored or hung up in the airplane when not in use. Care should be exercised to prevent the mask being exposed to sunlight, as this causes rapid deterioration of the rubber in the masks.

5. PYROTECHNICS.

The airplane is equipped with an M-8 pyrotechnic flare pistol which is stowed in a bracket on the floor at the left side of the pilot's seat. For firing the pistol a mount is provided on the side of the fuselage to the left of the pilot's seat. Six flares are stowed in a canvas container just behind the left side of the pilot's seat. To insert a flare in the pistol, pull on the lower handle above the barrel and break it in the same manner as an ordinary revolver. The pistol may be loaded while it is in the firing mount. When the upper handle on the barrel is pulled, the pistol is released from the firing mount.

6. AUXILIARY FUEL TANKS.

Provisions are made for carrying either an auxiliary 75-gallon capacity combat fuel tank, or a 150-gallon capacity ferrying fuel tank attached to each wing bomb rack. The combat tanks are to be used for special extended long-range scouting or combat missions, and the ferrying tanks are to be used for ferrying purposes. Both type tanks are droppable simultaneously by placing the bomb control handle, located at the left side of the cockpit, in the "SALVO" position. An alternate means of releasing the tanks is by setting the bomb control in the "SELECTIVE" position, placing the safety switch in the "ON" position, and pressing the bomb release button at the top of the pilot's control stick. When auxiliary tanks are installed, fuel from these tanks shall be used when cruising flight is established.

WARNING

It requires approximately 10 seconds for the fuel from the second auxiliary tank to reach the engine after the fuel from the tank first used has been depleted.

A separate selector valve control for the auxiliary tanks is located on a pedestal to the right and forward of the control stick. Fuel gages are not provided for the auxiliary tanks.

IMPORTANT

In case a forced landing is necessary, the tanks should be dropped prior to landing, if time permits. This is still true in the event of a forced landing on water. The tanks may not be used for flotation purposes.

APPENDIX 1

U. S. A. - BRITISH GLOSSARY

	American Terminology	*British Terminology*
1.	AIRFOIL	AEROFOIL
2.	AIRPLANE	AEROPLANE
3.	ARMOR	ARMOUR
4.	BATTERY	ACCUMULATOR
5.	CALIBER	CALIBRE
6.	CARBURETOR	CARBURETTOR
7.	CENTER	CENTRE
8.	COCKPIT ENCLOSURE (CANOPY)	COCKPIT HOOD
9.	CONTROL STICK	CONTROL COLUMN
10.	EMPENNAGE	TAIL UNIT
11.	FIRE WALL	FIREPROOF BULKHEAD
12.	HORIZONTAL STABILIZER	TAIL PLANE
13.	LANDING GEAR	UNDERCARRIAGE
14.	LEFT	PORT
15.	LEFT WING	PORT MAIN PLANE
16.	LINES	PIPES
17.	MANEUVER	MANOEUVRE
18.	MANIFOLD PRESSURE	BOOST
19.	SHOCK STRUT	OLEO LEG
20.	NOSE-OVER STRUCTURE	OVERTURNING PYLON
21.	PROPELLER	AIRSCREW
22.	RADIO	WIRELESS
23.	RIGHT	STARBOARD
24.	RIGHT WING	STARBOARD MAIN PLANE
25.	SURFACE CONTROL LOCK	LOCKING GEAR
26.	SURFACE CONTROLS	FLYING CONTROLS
27.	TRIM TABS	TRIMMING FLAPS OR TABS
28.	VERTICAL STABILIZER	FIN
29.	WING	MAIN PLANE
30.	WING TIPS	PLANE TIPS